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CORE LOGIC
Discover how a good chipset can pump up your PC, and how a bad one can choke it. *Page 46*

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Why you should make sure it's dual-core compatible. *Page 38*

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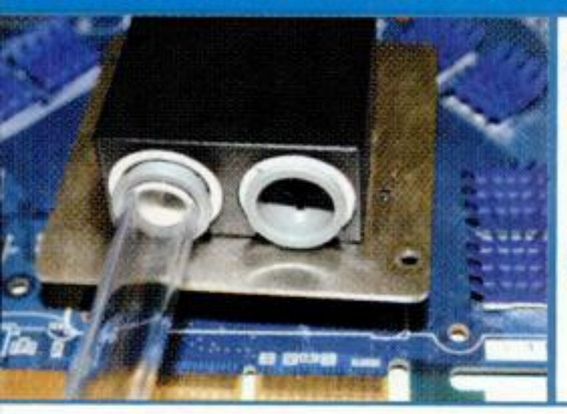

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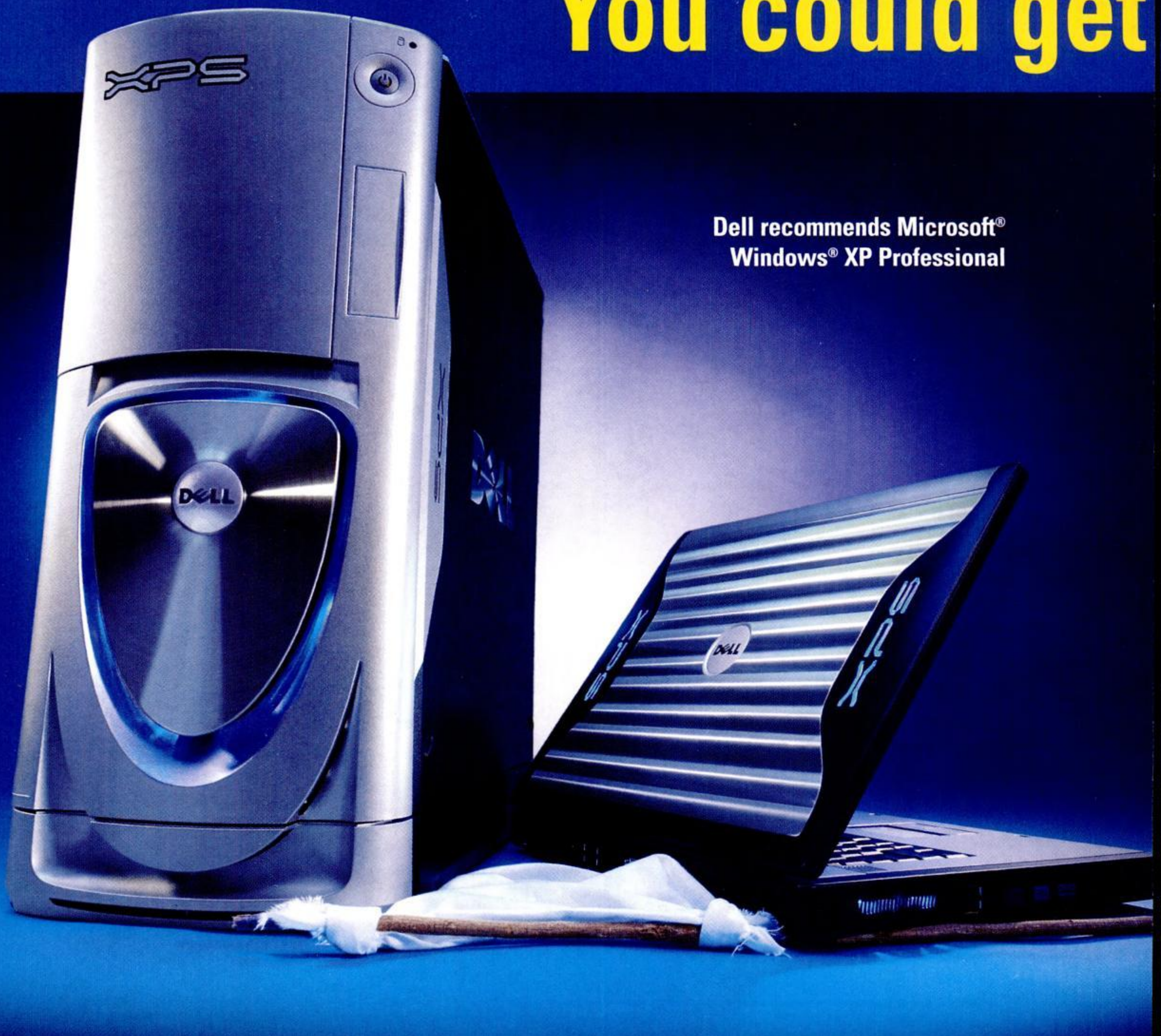

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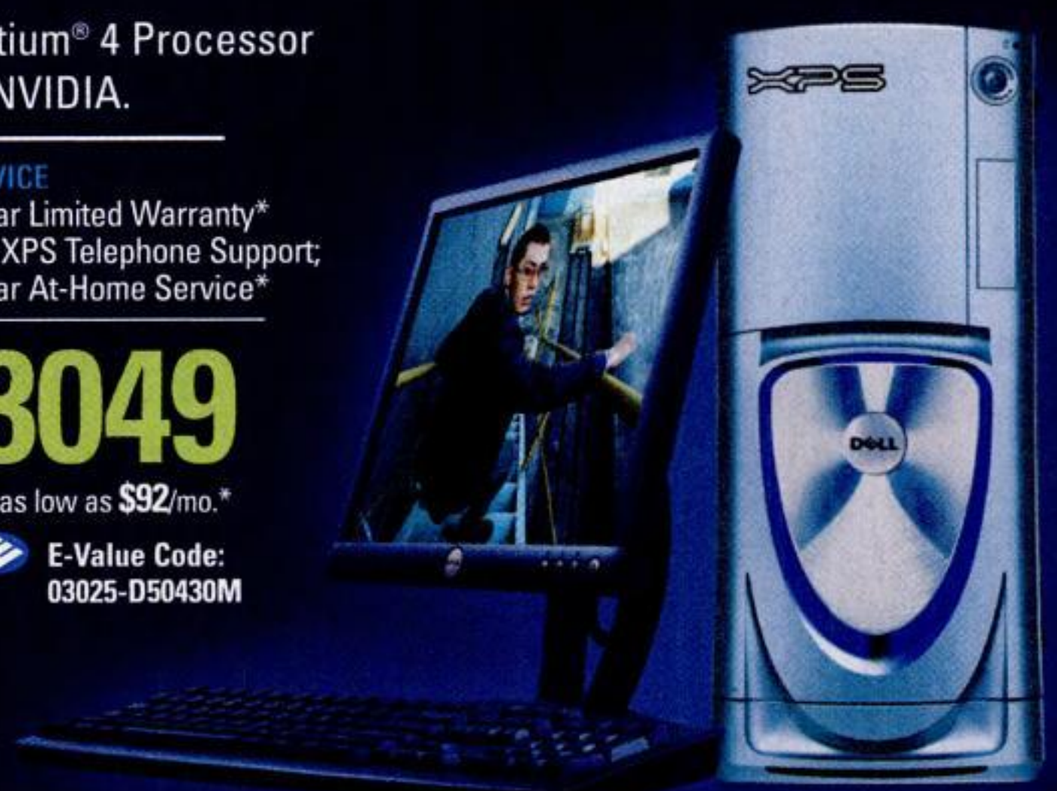

Some rigs have see-through sides and candy-coated finishes. Others have plastic robot heads sticking out of the top. But few can match Dell's elite Inspiron and Dimension gaming systems with their blazing-fast Intel® Processors. Both machines feature fast dual channel DDR2 SDRAM, excellent graphics cards and impressive thermal management for keeping cool in the heat of battle. So it's up to you. You can try to intimidate your opponents with a machine that looks like a carnival ride. Or you can choose a sleek XPS gaming machine and reduce them to a quivering, gelatinous blob.

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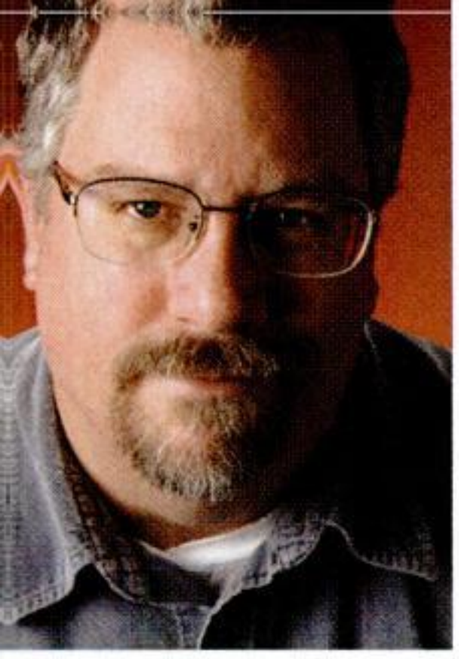

Release Notes

Be Careful What You Wish For

My dad gave me some advice when I was a kid. "Be careful what you wish for," he said, "because you just might get it."

I've thought of that advice many times over the past few weeks as I've pondered my role as editor in chief of *Maximum PC*. As I said in my first column ["I Am the Firestarter," March 2005], I never got over the unmitigated joy of writing for this magazine. And the more time I spent in meetings, tending to details, and performing the administrative duties that a manager is tasked with, the more I realized how little time I was spending playing with the latest tech gear, talking with vendors about developing trends and new products, and writing.

As much as I thought I wanted to be editor in chief of this great magazine, I've come to realize that while being at the top of the masthead has been an honor, it wasn't delivering the sense of professional accomplishment I'm looking for. So I am relinquishing the title of editor in chief and stepping into the role of executive editor, where I'll be able to do more of what I dig about being a journalist: benchmarking hardware, evaluating software, celebrating the best products the tech industry has to offer—and mercilessly disparaging the rest.

The editor in chief's job is unquestionably the most important position at any magazine. This is the person who is responsible for setting the magazine's editorial direction, for deciding which stories and products are worthy of coverage, for honing the magazine's edge, and for keeping the rest of us on our toes. It gives me great pleasure to inform you that beginning with the very next issue, that position will be filled by *Maximum PC*'s current executive editor, Will Smith.

Will brings supreme tech savvy, excellent leadership skills, and unshakable integrity to the job. He's going to make a fantastic leader.

—MICHAEL BROWN

THE EIC'S PICKS

MOTHERBOARDS: A TO Z
Mobo expert Gordon Mah Ung outdoes himself with this in-depth cover story on the most important component inside your PC. *Page 34*

WATER COOLING
Whether you're into overclocking or just hate the noise of whirring fans, Josh Norem's water-cooling feature is a must-read. *Page 48*

A PHYSICS ACCELERATOR?
It's not often that an entirely new category of technology is created. This one is either going to be an important new development in game technology, or a colossal joke. *Page 14*

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IN THE *HEATSINK-OR-SWIM* JUNE ISSUE OF MAXIMUM PC

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WHAT'S IN STORE FOR DUAL CORE?

With the megahertz race pretty much over, dual- and multicore computing will soon be the essential foundation of a power user's rig. We beat the hard facts out of Intel and AMD, and we'll tell you about their plans to revolutionize consumer computing with dual-core desktops (they're coming sooner than you think!).

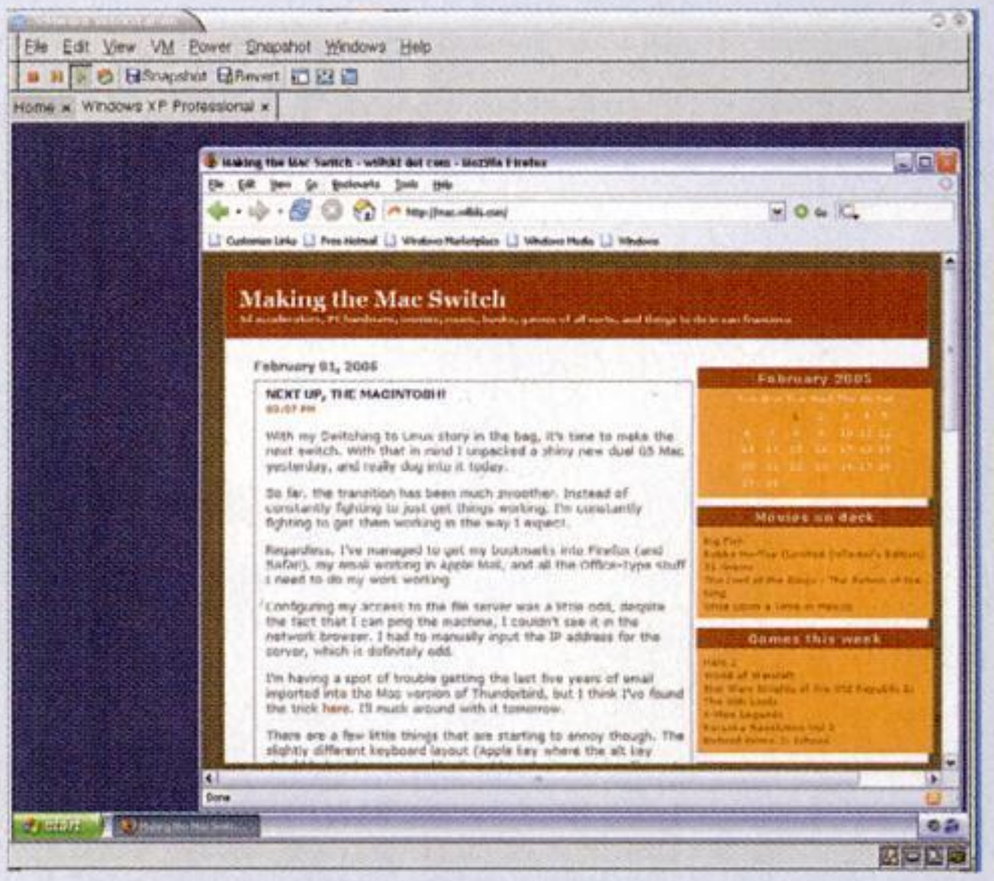
ENCRYPT YOUR DISK-ON-KEY

Your shiny new 2GB thumb drive is a kick-ass way to carry your data from work to home, but what happens if you lose the tiny device? You can avoid becoming the next Paris Hilton by encrypting the data stored on your portable drives with simple—and secure—encryption utilities that work on every PC. We'll show you how!

MAXIMUM MAC?

In Will Smith's review of *VMWare Workstation 4.5* [March 2005], there's a clearly visible image of a website called "Making the Mac Switch." I love my Powerbook G4, but I feel that some less-forgiving *Maximum PC* readers might deem this subliminal message to be offensive. After all, most of your readers are hardcore PC fanatics, and even the thought of using a Mac would sicken them. Personally, I use my Mac for business and my PC for play. I read *Maximum PC* for its trustworthy PC hardware reviews. Please don't remind me of work while I play.

—ED BALCH



EXECUTIVE EDITOR WILL SMITH RESPONDS: On a normal day, we'd find that kind of subliminal trickery underhanded and mean as well. As part of my ongoing series of adventures with alternate operating systems—check out my story "From Windows to Linux" in the February 2005 issue—I've shelved my Linux box for six months and switched to a dual G5 running OS X Panther. The website you're referring to is a blog I set up to help me keep track of my experiences as I use the new Mac. Feel free to check out the website at http://mac.willski.com.

live-performance route. MP3s and WMAs are already great, and I don't need a bit more quality from them if they're going to take one more CPU cycle or one more byte of hard drive space.

—PAUL OSTERMAN

Regarding Michael Brown's comments on MP3s, is there an echo in the room? Actually, I have lightened up recently, and I do subscribe to a download service. Thanks to MP3s, I can decide which music I'm willing to pay the price of a CD for. I also enjoy the ability to download old performances that are no longer in circulation, except in the backwaters of people's hard drives. It's rather like opening up a time capsule—give it a try, you won't regret it.

—BILLY L. DAVENPORT

Thank you. I thought I was the only one in the world who misses sound quality. Give me a download service with high-quality audio—even if it's at a premium price—and I'm on board. I'll begrudgingly admit that MP3s are so convenient that they can't be denied, and they sound fine when I'm jogging; but, hey, so does FM. What about when you want to listen to ethereal highs or the delicate background sounds of guitar strings that are brushed only accidentally. I bet a lot of people would be shocked by just how good music can actually sound.

—ROGER STEINBACH

THE TIC CODE

I need help deciding on a new digital video camera. It's not an easy task, because I have Tourette's syndrome (not the fun kind, where you swear all the time, just the kind where you twitch enough to spill coffee on yourself in the morning). I would like to buy a recorder that can smooth out the twitches as much as possible. I don't have a problem holding the camera, just keeping it still. The Army trusted me with live grenades and a rifle, so I think I can handle a video camera. At least if I drop that, no one dies. Thanks for the help.

—BRIANA WARNER

SPECIAL PROJECTS EDITOR STEVE KLETT RESPONDS: It's tough to make a recommendation without knowing how still you're able to hold a camcorder, but many camcorder models offer an image-stabilization feature. Although I don't have personal experience with it, Sony's 3CCD DCR-HC1000 has received very good reviews. My only other suggestion would be to try shooting on a tripod and operating the camcorder with a remote control. ■

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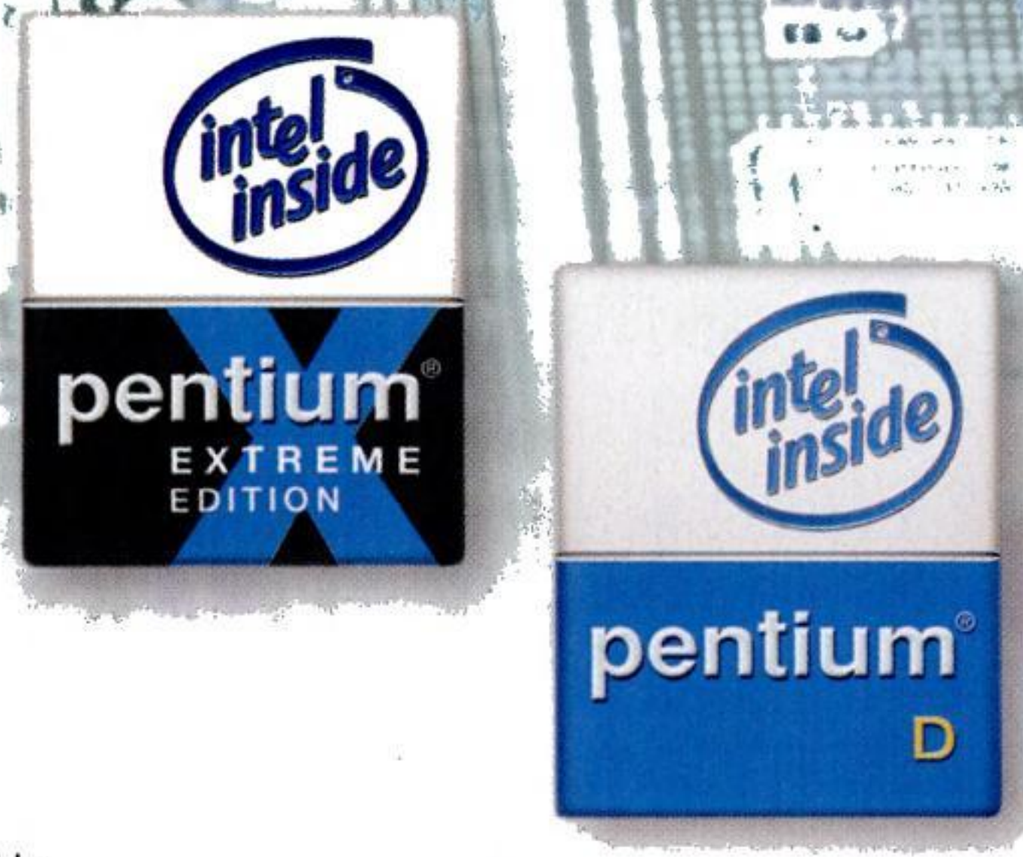
QuickStart

The beginning of the magazine, where articles are small



Notice the missing number 4? Despite architecture similarities, Intel is chucking the long-used digit from its new dual-core Pentiums.

Sayonara, Pentium 4?

Intel comes out swinging with a host of hot new dual-core CPUs

Who says it ain't a race? Intel, which last September said it wasn't rushing to ship the first dual-core procs, has apparently crossed the finish line. The company recently pulled the wraps off a host of new dual-core processors planned for this year and next, with products slated for duty in everything from notebooks to desktops to server applications.

As expected, the first dual-core processors for the desktop will be based on the Prescott core. Unlike the new P4 660, which has 2MB of L2 cache, the new dual-core "Pentium D" will feature 1MB of cache per core and will run on an 800MHz bus. The dual-core Extreme Edition 840 is virtually the same as the Pentium D, but will have Hyper-Threading enabled in both cores.

The first dual-core CPUs will have two cores within a single die, meaning two separate execution cores will share the same piece of silicon and use the same front-side bus (see Tom Halfhill's column on page 13 for more information on the difference between dual-core and multi-core processors). Intel says it had to clock the CPU cores down from the current 3.8GHz Prescott to 3.2GHz because of thermal and power restrictions. Intel also says dual-core chips will use an 800MHz front-side bus rather than a 1066MHz bus to compensate for power, frequency, and other issues.

Both dual-core processors will have 64-bit support as well as Microsoft's anti-worm NX technology. Intel didn't disclose pricing, but the processors are expected to ship in limited quantities by the time you read this.

Beyond the Desktop

In an apparent move to show the world that it's back in charge, Intel didn't show off just its desktop processors, but also its dual-core server CPUs. And even more surprisingly, Intel showed off working samples of its next-generation mobile processor, code-named Yonah, and its desktop processor, code-named Presler, both of which use a new 65nm process. (Current Prescott and dual-core procs are based on a 90nm process.) By moving to 65nm, Intel will significantly shrink the size of its cores and implement a new design that uses two cores in the same package instead of two cores on the same die.

Intel says it has 15 dual-core processors in the works and expects that by 2006, 70 percent of shipping desktop machines will be outfitted with dual-core CPUs. Company execs predict that by the end of the decade, consumer desktop PCs will have eight threads available, but did not disclose whether those threads would be eight separate cores in a CPU or four cores with Hyper-Threading.

Single-Core Plans

With the release of dual-core procs, many wondered if Intel would be shelving the Pentium 4. Intel won't divulge any details of the P4's future, but does say that single-core computing will continue beyond at least 2006. Early next year, Intel will release the successor to the Prescott, code-named Cedar Mill. This chip will feature 2MB of L2, Hyper-Threading, 64-bit support, and will be built on the new 65nm process.

INTEL PROCESSOR COMPARISON

NAME	Pentium 4 Extreme Edition	Pentium 4 560J	Pentium 4 660	Pentium 4 Extreme Edition	Pentium D (dual-core)	Pentium Extreme Edition 840 (dual-core)
Clock speed	3.46GHz	3.6GHz	3.6GHz	3.73GHz	3.2GHz	3.2GHz
Process	130nm	90nm	90nm	90nm	90nm	90nm
Execution cores	1	1	1	1	2	2
L2 cache	512KB	1MB	2MB	2MB	1MB	1MB
L3 cache	2MB	0	0	0	0	0
Hyper-Threading	Yes	Yes	Yes	Yes	No	Yes
FSB	1066MHz	800MHz	800MHz	1066MHz	800MHz	800MHz
64-bit support	No	No	Yes	Yes	Yes	Yes
Transistors	178 mil	125 mil	169 mil	169 mil	230 mil	230 mil
Die size	237 mm^2	112 mm^2	135 mm^2	135 mm^2	206 mm^2	206 mm^2
NX support?	No	Yes*	Yes	Yes	Yes	Yes
Instructions	SSE, SSE2	SSE, SSE2, SSE3	SSE, SSE2, SSE3	SSE, SSE2, SSE3	SSE, SSE2, SSE3	SSE, SSE2, SSE3

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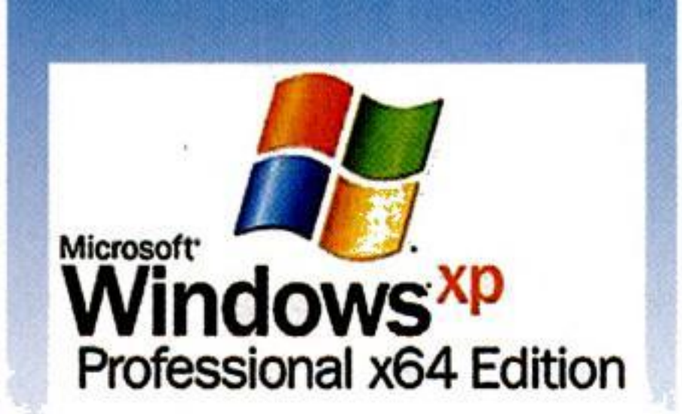
64-Bit Windows Arrives

Here's what it'll take to make the switch

By the time you read this, the long-awaited 64-bit version of Windows XP Professional (dubbed XP Professional x64) should be available. Whether or not you'll be able to upgrade to it, and give up your 32-bit XP license in the process, depends on several factors.

According to a Microsoft spokesman, the company intends to deliver the 64-bit Windows to existing users via a technology exchange program that will allow consumers to trade their 32-bit Windows XP licenses for free 64-bit Windows XP licenses. Here's the first in a long list of catches: You can only upgrade from Windows XP Professional Edition—if you own Windows XP Home Edition, you'll have to first upgrade to XP Pro and then trade it for an x64 license. Microsoft has no plans to offer XP Pro x64 as a stand-alone retail product.



Folks using XP Home Edition must first upgrade to XP Professional before they can download the 64-bit version.

If you own a personal copy of Windows XP Professional—i.e., it wasn't preinstalled on a PC you bought—you can go online, authenticate it, and download x64 just like a service pack.

If you acquired your copy of Windows XP Professional when you bought your PC—say, from Dell or HP—your upgrade path is through that OEM, and you'll need to check with the manufacturer to determine whether it's participating in the upgrade program. If you're still using Windows 98 or ME, whether you bought the OS at retail or it came with your PC, you're screwed. The only remaining way to get XP Professional x64 will be to purchase it preinstalled on a new PC.

WinFS File System Coming to XP

It's not just for Longhorn anymore

Microsoft's innovative new database-driven file system—named Windows Future Storage, or WinFS for short—was originally slated to appear exclusively in the Longhorn version of Windows. That is, until Redmond unceremoniously announced that WinFS would not ship with the next-gen OS, causing industry tongues to wag about whether the file system was being canned altogether or simply delayed. As it turns out, not only is WinFS still in the works, but it's going to be back-ported to Windows XP, according to news reports circulating on the Internet.

The Windows Future Storage file system allows for contextual searches of indexed files, and displays contextual pop-ups for files upon mouse-over.

The news comes as a surprise to XP users, who assumed Microsoft would use the allure of WinFS to entice people to upgrade when Longhorn ships. Microsoft's change in tack is likely a bid to ensure the highest possible rate of adoption for its new technology.

WinFS' database-driven design makes it possible to continuously index all the files on a hard drive. In turn, this makes it easy to obtain instantaneous, context-sensitive search results of all the files on a PC, and even on multiple PCs connected over a network. With this anxiously awaited feature coming to XP at some indeterminate time in the future, Microsoft will have to work extra hard to convince XP users that an upgrade to Longhorn is worth the cost and the trouble.

FAST FORWARD BY TOM R. HALFHILL

Multicore Madness

It's hard enough explaining the differences between multitasking, multiprocessing, multithreading, Hyper-Threading, single-core processors, multicore processors, and multiprocessor systems. Now Intel comes along and throws us another curve ball by announcing multicore processors that are actually multichip modules.

Intel recently announced a bunch of multicore processors with typically obscure code-names. Smithfield, officially christened Pentium D, has two Pentium 4-class processor cores on a single die. It's a true multicore processor. But when Intel moves to the next-generation 65-nanometer chip-fabrication process, the company will introduce a new desktop processor code-named Presler that encloses two die in one chip package. Presler will look like a multicore processor to the operating system, but inside, it will actually have only one core per die. That's not quite a true multicore processor.

There's a common term for a processor like Presler: multichip module (MCM). An MCM is simply a chip package containing two or more die. Old-timers might recall that Intel's Pentium Pro, introduced in 1995, was also an MCM. It enclosed a processor chip and an SRAM chip in a single package. The SRAM was an external L2 cache, because in those days it was too expensive to integrate a large L2 cache on the same die with the processor. But today, it's obviously not too expensive to integrate two processor cores on a single die. So why is Presler seemingly taking a step backward?

First answer: economy. The 65nm process shrink will dramatically reduce Intel's manufacturing cost for a single-core chip. MCMs are more expensive to produce, but Intel has made some advances in this technology since the Pentium Pro. Therefore, it will be cheaper for Intel to stuff two Presler-class dies into a single package than to make a dual-core Presler-class die, even with the additional cost of the MCM package.

Second answer: flexibility. By designing Presler with one core per die, Intel can make a lower-priced Celeron version of Presler with only one die per package. This would be even better for Intel, because the company wouldn't have to disable part of Presler's L2 cache to make a lower-end processor (as Intel does today with Celeron), and the single-die package would eliminate the extra cost of the MCM.

So Intel's multicore strategy certainly makes sense. And most people will call Presler a multicore processor without ever knowing the difference.

Tom Halfhill was formerly a senior editor for Byte *magazine and is now an analyst for* Microprocessor Report.

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FUN-SIZE NEWS

JUST WHAT WE NEED: ANOTHER ESRB RATING

Dissatisfied with the gaping chasm that exists between the games rating E (for everyone) and T (for teen), the Entertainment Software Ratings Board recently added a new category to its rating system—E10+. The new rating indicates the game is inappropriate for people under 10 years of age, and will be applied to "racing games with extreme crashes" or "fighting games with super heroes."

FAREWELL SOUNDSTORM

The "drip, drip, drip" noise you hear is the sound of our Colt 45 40 oz. tapping the pavement in honor of nVidia's recently deceased Soundstorm audio technology. According to recent statements by former *Maximum PC* editor and current nVidia PR guru Brian Del Rizzo, Soundstorm audio was just too costly to integrate into motherboards, especially compared with boards sans onboard sound. Plus, consumers are generally skeptical of onboard audio; and nobody complained when nVidia took it away, so the company figures it won't be missed anyway.

ROBOTS 0, TEENAGE GIRL 1

Several robotic manufacturers were feeling a little frisky recently, and decided to hold a "man vs. machine" arm-wrestling to see how their one-armed contraptions would fare against flesh-and-blood. They certainly didn't expect 17-year-old high school student Panna Felsen to show up and whoop every robot's ass. Felsen beat the first robot in 24 seconds, the second robot in four seconds, and the third robot in three seconds. The robots all use electroactive polymers (EAP), which are plastics that change shape when triggered chemically. The tech is supposed to emulate real muscles, but it's clearly years away from rivaling the strength of a high-school girl.

GAME DEVELOPER QUOTE OF THE MONTH

"Through our own research we know that most gamers want in-game advertisements to heighten the sense of realism."
—*Funcom*

Introducing the World's First Physics Accelerator

Is the added performance worth emptying gamers' pockets?

Just when you thought gaming PCs couldn't become any more outlandish, expensive, or over-the-top, along comes the announcement of the industry's first add-in physics accelerator, due to arrive in time for the 2005 holiday season. Like the original 3D accelerators, it will fill an expansion slot in your PC and take on the increasingly heavy workload of calculating physics behaviors, including object collisions, particle effects, the animated "bones" in characters, and more.

Named PhysX, the add-in board will most likely boast 128MB of GDDR-3 memory and will be offered in both PCI Express and PCI interfaces. According to Ageia (**www.ageia.com**), the company producing the technology, the addition of a dedicated physics accelerator to handle in-game physics will help shoulder the burden currently handled by already overstressed CPUs. For example, today's fastest CPUs are only capable of crunching the numbers for several hundred bones at one time. Ageia claims that with a physics accelerator, you could possibly perform calculations for up to *50,000* bones simultaneously, making massive *Lord of the Rings*-style battles and even more advanced effects like lifelike clothing, tissue, and hair simulation possible.

The PhysX accelerator's custom-designed processor can handle 100 times as many physics calculations as today's fastest CPUs.

Ageia has reportedly already signed up 15 development teams to integrate its physics API into upcoming A-list games. The most notable signatory thus far is Epic Games, which has integrated PhysX technology into the eagerly anticipated *Unreal 3* engine.

At press time, little information was available regarding specifics of the card, but a company representative gave a price range of $100 to $400, and availability is slated for the end of 2005. As soon as we can get our grubby hands on the product, we'll be sure to run it through the *Maximum PC* wringer.

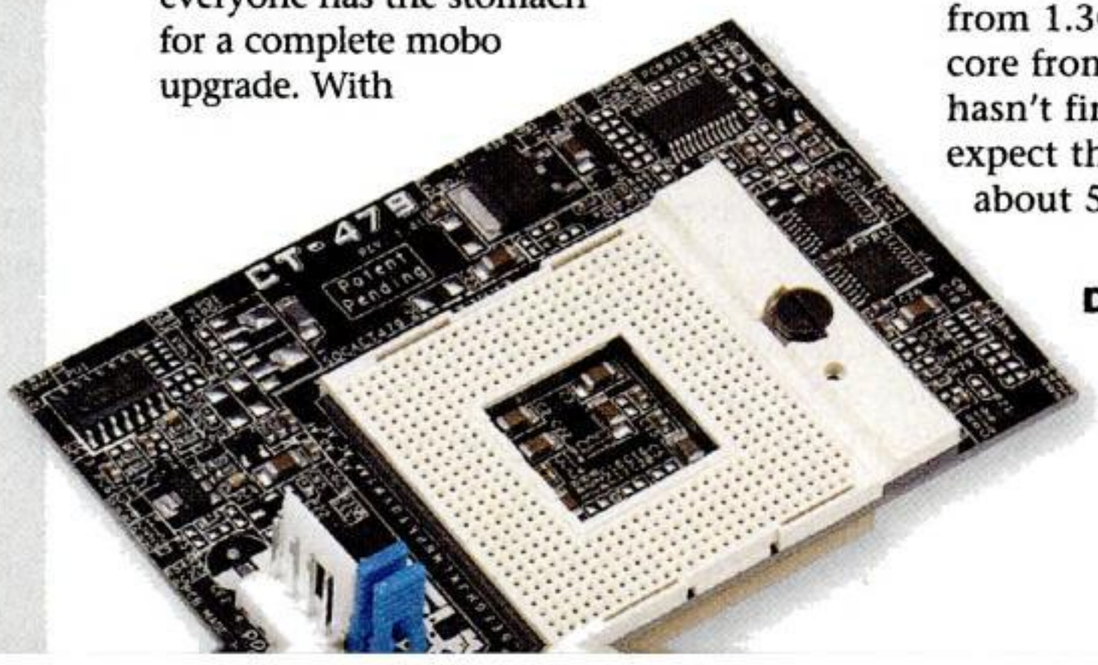
Pentium M Conversion Kit Arrives

Adapter breathes new life into aging mobos

We don't have to tell you that the hot upgrade these days is from an older Pentium 4 to a cooler, quieter Pentium M processor. The formerly "mobile only" processors generate less heat than standard P4s while still offering blazing speeds in apps and games. The problem is that there are only two Pentium M motherboards on the market these days, and not everyone has the stomach for a complete mobo upgrade. With this in mind, Asus is offering owners of its Socket 478 mobos a simple adapter that enables Pentium M support.

The CT-479 CPU Upgrade Kit includes the adapter and a cooling fan made specifically for the Pentium M processor. As of press time, the adapter is designed to plug into the Asus P4P800 SE and P4P800-VM motherboards only, though Asus says more boards will land on the compatibility list as soon as they undergo testing (check **www.asus.com** for the latest version of the list). In order to get the adapter up and running, you'll also have to download a BIOS update from the Asus website; updates are available for each board that supports the adapter.

The Pentium M processors supported by the CT-479 kit are the Celeron Ms from 1.2GHz to 1.7GHz, the Banias core from 1.3GHz to 1.7GHz, and the Dothan core from 1.5GHz to 2.26GHz. Asus hasn't finalized pricing, but you should expect the adapter to ship soon and cost about 50 bucks.



Drop this puppy into select Asus Socket 478 boards and—*bam!*—you're ready to run a Pentium M processor.

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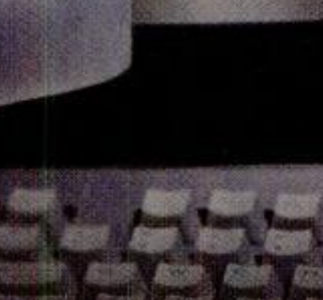

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GAME THEORY BY THOMAS L. McDONALD

Beat on the Brat (with a Baseball Bat?)

Personal and parental responsibility is a semi-ongoing theme of this column, and I've read so many attacks on games by half-assed politicians looking to score cheap political points that I've spent all my outrage. Well, *almost* all of it.

The latest idiocy to pop across my screen was an article from Seattle headlined "Bill Would Hold Game Makers Accountable for Players' Actions." I saw this only minutes after a Drudge headline that read "Microsoft Robots to Watch Kids," leading me to wonder if Bill Gates was deploying his killbots to monitor groups of game-playing kids and weed out the campers and spawn killers. If only.

The article was about a Washington state House bill that would "hold the makers and sellers of violent video games liable if someone under 17 years old commits a crime, *due in any part*, to playing the game." (KOMO 1000 News, 3/1/05, emphasis added)

Bill Hanson of the Washington Police and Sheriff's Association thinks this is a swell idea: "If you sit up and watch this and play these games over and over again... it seems that this is alright to walk up and hit a police officer over the head with a bat."

Seems all right to *whom?* This has never, and will never, happen. *Ever.* And the person who claims it did happen is looking for a cheap excuse and a free pass from the core requirement of being a human being: personal responsibility. Games are pretty flimsy things to bear the weight of responsibility for civilization's collapse.

Look, conservatives will continue to flog the issue to score points with their base, but they know the bottom line is decided by the marketplace. Liberals will hitch up their First Amendment diapers and continue to oppose these half-hearted gestures, thus scoring points with their base. Editorial writers will continue to weigh in on both sides of the issue, thus maintaining job security.

I've already spent my time fretting about the latest cryptofascist boogeyman of the liberal imagination, whether his current name is Ed Meese or Pat Robertson or Joe Lieberman. Political poseurs come and go, but porn and M-rated games endure, with a shocking paucity of baseball-bat attacks to their credit. To be honest, the notion that games induce crime is much less important to me than the far more immediate concern I have about spawn campers, so let's hope the MSKillbots are deployed sooner rather

Tom McDonald has been covering games for countless magazines and newspapers for 11 years. He lives in the New Jersey Pine Barrens.

AMD Takes Aim at Centrino

Cool-running processor puts the heat on Intel

AMD's Turion 64 processor family will be paired with chipsets from ATI and VIA at launch, with an nVidia chipset reportedly in the pipeline.

Continuing its trend of pushing into new markets dominated by Intel, AMD has announced an all-new processor line designed to clash head-on with Intel's popular Centrino platform. Dubbed Turion 64, the new processor appears tantalizing on paper, and should be able to give Intel a serious run for its money.

The Turion bears many similarities to the desktop Athlon 64 line. It's a 64-bit processor and includes an integrated memory controller. This enables the front-side bus to run at the same speed as the processor core, between 1.6GHz and 2GHz in the case of the Turion 64. This spanks the puny 533MHz front-side bus used by Intel's Pentium M processors.

Another area where Turion 64 kicks sand in Intel's face is security. The Turion features NX (or No Execute) technology, which prevents trojans and other types of malicious code from executing commands from within main system memory. NX is found only on Intel's high-end desktop processors.

As a mobile processor, the Turion uses the obligatory PowerNow! technology to reduce core speed and voltage according to workload demands. Turion 64 also integrates support for every type of Wi-Fi available, and Bluetooth to boot.

Now for the bad news: AMD has chosen a bizarre alphanumeric naming scheme that is certain to cause confusion in the marketplace. For example, its high-end processor is named ML-37, and its low-end chip is named MT-30. The M stands for "mobile," but the letter after that indicates its level of portability (the higher the letter, the better the proc's battery life). Because the T designator is further down the alphabet than L, the latter should be more portable. The two-digit number at the end of the name indicates relative performance; because 37 is a higher number than 30, we know it's a faster processor.

The Un-Keyboard

Ergodex unveils DIY keyboard

Got seven fingers on one hand and three on the other? The DX1 is all the keyboard you'll ever need.

The classic QWERTY keyboard layout was invented in the late 1800s and designed to prevent people from typing too fast and damaging their typewriters. It's no wonder then that hours spent playing a fast-paced game with a QWERTY keyboard can be a hand-numbing experience. Instead of playing *Twister* with your fingers to crouch-jump and rain ordnance on your enemies, why not put the keys where *you* think they should be?

That's the alternative Ergodex is offering with its DX1 Input System. The kit comes with a USB-connected 9x11-inch tablet and 25 numbered keys that can be arranged in virtually any configuration with reusable adhesive. You can bind keys to any function, just like a regular keyboard, but you can also record and assign a macro to each key. Macros can include multiple functions and timing delays, so you can, for example, cast a Magic Missile spell, wait for your magic powers to restore themselves, and then follow that up with a devastating Shatter invocation—all from a single keypress. OK, you could also use the DX1 Input System for audio, video, or productivity apps—but we'll see you in deathmatch, sucka.

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Head2Head

A showdown among natural PC competitors

THIS MONTH: Surround-Sound Headphones

When we heard about headphones capable of replicating the surround-sound effect of 5.1- or 6.1-channel speaker systems, we donned our hip boots and prepared to wade into some deep BS. But after listening to a couple sets—wireless, no less—from Pioneer and Sony, we put our boots back into the closet. Neither product is cheap; in fact, both of these sets cost more than a high-end 5.1 PC speaker rig. Can either of these puppies live up to their hype—and their price tags? Let's find out.

—STEVE KLETT

PIONEER SE-DIR800C

Sound processor: Both models consist of a wired transceiver that receives an input signal from a source and beams the audio (via infrared) to one or more pairs of wireless, battery-powered headphones. Pioneer's transceiver features two digital inputs (one optical, one coaxial) and one analog input (stereo RCA). A front-panel switch selects the active input. The receiver is outfitted with decoders for Dolby Digital, Dolby Pro Logic II, and DTS. It re-encodes these signals into two channels, which replicate the acoustic effect of five speakers plus a sub-woofer. There are also three listening options that replicate the acoustic effects of a recording studio, a living room, or a movie theater/concert hall. These are all solid specs, but Sony's transceiver offers this and more. **Winner: Sony MDR-DS8000**

Headphones: The soft, generously padded earmuffs are a closed design that's very effective at eliminating background noise, such as the hum of a nearby PC. The infrared receiver provides clear, crisp signals devoid of interference at the maximum stated range of 26 feet, as long as you stay in line of sight of the receiver. Beyond that distance, we experienced drop-outs and interference. Although the phones are a bit bulky, the double-banded, self-adjusting headband remains comfortable after several hours of continuous use. We really like the easy-to-reach volume control on the right-hand headphone case. The phones are powered by two rechargeable AA batteries (included, with the charger housed inside the transceiver) that provided several days of heavy use on a single charge; unfortunately, the set does not have an auto on/off function. **Winner: Sony MDR-DS8000**

Performance: The 800Cs churned out very believable surround-sound effects with movies, music, and games in both living-room and home-office use. Directional audio cues, such as the ricocheting bullets in *Saving Private Ryan*, sounded truly "out of head." Having said that, surround effects do sound "closer" than they would with an actual 5.1-channel system (this is also true of Sony's set). Still, the Pioneer 800C provided the best 5.1 effect we'd ever heard in a set of headphones; that is, until we tried Sony's product. **Winner: Sony MDR-DS8000**

MAXIMUM PC VERDICT 8

+ 5.1

Accurate, natural surround effects; comfortable design; integrated battery charger; a good price.

− 0.0

Only one optical-in, and no auto on/off. Slow battery recharge.

$400, www.pioneerelectronics.com

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SONY MDR-DS8000

Sound processor: The MDR-DS8000 transceiver not only does more than the 800C does—it looks and sounds better while doing it. It features two digital optical inputs, plus a set of analog RCA inputs. This stylish kit will decode just about any digital audio signal you can think of: DTS, DTS ES, Dolby Digital, Dolby Digital EX, Dolby Surround, Dolby Pro Logic II, and MPEG-2 AAC. It can also replicate not just 5.1-channel surround sound, but 6.1-channel sound, too. **Winner: Sony MDR-DS8000**

Headphones: The DS8000 headphones have a round, open-air design that provides a cooler fit and slightly richer sound, but this does render them more susceptible to interference from background noise. The headset controls are on the interior of the right speaker pod, so the volume dial can be tricky to use without taking the headphones off. A pod above the left headphone houses Sony's Gyrotrak head-tracking system, which enables you to move your head without changing the directional effect of the audio. With Gyrotrak, you can dance around to a concert DVD without destroying the illusion of being front and center. (Not that *we* did this, of course—at least there aren't any pictures.) Despite the open design, Sony's headphones are bulkier than Pioneer's, and they weren't quite as comfortable for long stretches. But three features trump these drawbacks: Gyrotrak, an auto on/off feature, and a longer infrared range (33 feet). **Winner: Sony MDR-DS8000**

Performance: The MDR-DS8000s delivered crisper, more pronounced surround-sound effects across all categories: music, movies, and games. They were also slightly better than the 800Cs when it came to delivering conventional stereo audio. **Winner: Sony MDR-DS8000**

MAXIMUM PC VERDICT 9

EPISODE IV

Rich music playback, more pronounced surround effects, and features aplenty.

EPISODE I

Somewhat bulky design, tough-to-reach volume dial, and a bit tough to configure.

$800, www.sonystyle.com

THE UPSHOT

Pioneer failed to win a single category, but that doesn't mean the 800Cs aren't excellent—especially if you're on a budget. The Sony's are just a step ahead. There's bad news for PC gamers hoping to quiet their lives with these headphones, however. Neither set sports 5.1 analog inputs, therefore most soundcards are incapable of delivering a true 5.1 signal to the 'phones. That means no positional sound in most games. The good news is that with the proper signal, both sets deliver on the promise of natural-sounding surround effects. These headphones can't match the floor-quaking effect of a booming multichannel surround-sound system, but they're the next best thing. ■

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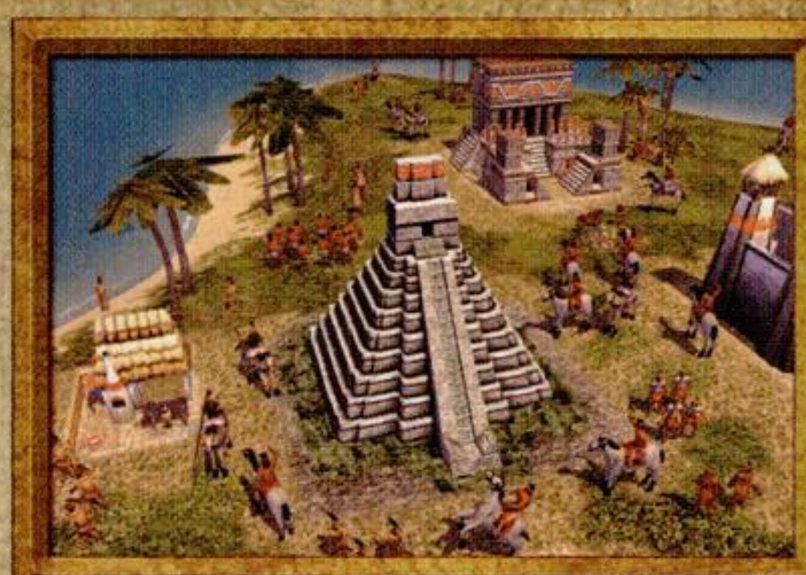

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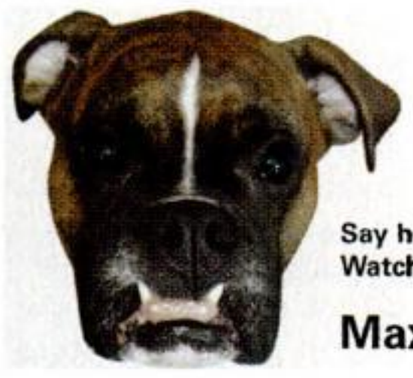
WatchDog



Say hello to Roscoe, WatchDog of the Month

Maximum PC takes a bite out of bad gear

THIS MONTH: The WatchDog goes after...
>IBM 75GXP Deskstar >Altec Lansing >CompUSA >QPS

IBM "Deathstar" Settlement in the Works

IBM is close to settling a long-running class-action lawsuit over its famously fast but flaky 75GXP Deskstar hard drives, the Dog has learned. The settlement, which still has to be approved by a Texas judge, would give owners of failed 75GXPs about $100 each. *Maximum PC* reader Michael T. Granito Jr. filed the class-action suit in 2001 after he had several of the drives fail on him. Granito wasn't the only person to suffer the problem, though. Readers complained in droves about the drives dying after emitting a "scratch, scratch, katunk" noise.

The suit alleged that the drives contained a manufacturing defect and that IBM knowingly misrepresented the drives' reliability to the public. While the suit ran its course, IBM sold its hard drive division to Hitachi Global Storage.

The proposed settlement covers drives purchased in the United States between March 15, 2000 and March 4, 2004, and includes the DTLA-307-015, DTLA-307-020, DTLA-307-030, DTLA-307-045, DTLA-307-060, and DTLA-307-075 models. Only consumers are eligible for the reimbursement, not resellers. The suit covers consumers who either purchased the drives separately or received the drives with a new system.

"READERS COMPLAINED IN DROVES ABOUT THE DRIVES DYING AFTER EMITTING A 'SCRATCH, SCRATCH, KATUNK' NOISE."

The proposed settlement outlines two benefits: If your drive failed, you might be eligible for a $100 check. If your drive has not failed, you can receive a 25-pack of CD-R discs with jewel cases (the Dog can hear the sound of 15GB hard drives being dropped on the ground everywhere). If you don't want the 25-pack of media, you can opt for a coupon for 15 percent off hardware at IBM.com—you know, just in case you wanted to buy a super-computer cluster.

Is a $100 settlement enough? That depends on how you look at it. If you spent $600 on a 75GB Deskstar that went south taking home videos and digital images with it, $100 is a pittance. In the scope of class-action lawsuit settlements, however, $100 isn't something to sneeze at. For example, a class-action suit against Iomega over its "click of death" Zip drives netted consumers a coupon for different Iomega Zip drives and accessories.

But the IBM settlement seems paltry when you compare it with similar cases filed by the IBM suit's class-action lawyer, Jonathan Shub. If you're not up on recent history, Shub and the law firm Sheller, Ludwig & Badey successfully sued Kenwood to get consumers of its 40x40 drives a 72x replacement. A lawsuit filed against Philips got owners of the company's defective 2x burners new 8x replacements (which was fast at the time). And in a settlement with Fujitsu over a defective HD, Shub and Co. got the manufacturer to pony up $45 per bad drive and up to $1,200 in data recovery services. Woah.

If IBM consumers aren't as well compensated, it's likely due to the case's relative weakness. True, IBM documents unearthed in discovery and covered in this column seemed to show the company had concerns about the reliability of the drive, with an employee even calling it the "worst product in the field." But the truth is, the lawsuit was on an uphill battle from the get-go. An early setback occurred when the suit was denied nationwide status, so individual suits had to be filed in California, Connecticut, Florida, Illinois, Michigan, New Jersey, New York, Ohio, and Pennsylvania. Had those individual suits succeeded, people in the other 41 states would have received bupkis.

As part of the proposed settlement, however, consumers in all 50 states will be eligible for reimbursement for bad drives. Claim forms and more information on the settlement will be made available at www.deskstar75gxpsettlement.com.

Attorneys were also never able to unearth a smoking gun that showed IBM clearly in the wrong. In much of the discovery, IBM employees handwring, kvetch, and allude to drive contamination, hushed firmware updates, and other problems, but offer nothing truly damning. To this day, IBM's lawyers maintain that the problem was caused by users who installed the drives improperly.

Some 75GXP drives survive to this day, but not even the bravest soul among us will entrust data to a drive with such a poor reputation for reliability.

So does this vindicate the reliability of the 75GXPs? Not in the Dog's eyes. The Deskstar's reputation as the "Deathstar" is well deserved judging by the deluge of complaints from *Maximum PC* readers, a steady drum of consumer complaints on the Internet, and our own personal experiences. While $100 is something, it's a shame IBM never did the right thing by recalling the bad drives or being forthright about known issues. With the company's HD division gone and its PC division going, there's not much consumers can do to punish IBM for the 75GXP debacle.

A FEW GOOD DOGS...

Think your favorite pooch has what it takes to be "WatchDog of the Month"? Send a high-resolution image of your canine to Watchdog@maximumpc.com.

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Products
Vista Collection

OFFER EXTENDED!

Test drive the 1&1 BusinessPro Package – 1&1's most popular hosting plan – including all the professional tools you need!

- ✓ 6 Month FREE Trial!
- ✓ No Credit Card Required!
- ✓ No Strings Attached!
- ✓ 1 Domain Name Included!

1&1 TEST DRIVE 2005

January 1 – April 24, 2005

REGISTER DOMAINS:

.COM, .NET, .ORG, .INFO, .NAME, .US

$5.99 PER YEAR

1&1 INSTANT MAIL	ALL-INCLUSIVE WEB HOSTING	TURNKEY eSHOPS	DEDICATED SERVERS
$0.99 PER MONTH	FROM $4.99 PER MONTH	FROM $9.99 PER MONTH	FROM $69 PER MONTH

1&1

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Small Businesses helped make
This month we invite all SMBs

Inside every small business there's a website waiting to get out

Brown & Simmons Realtors

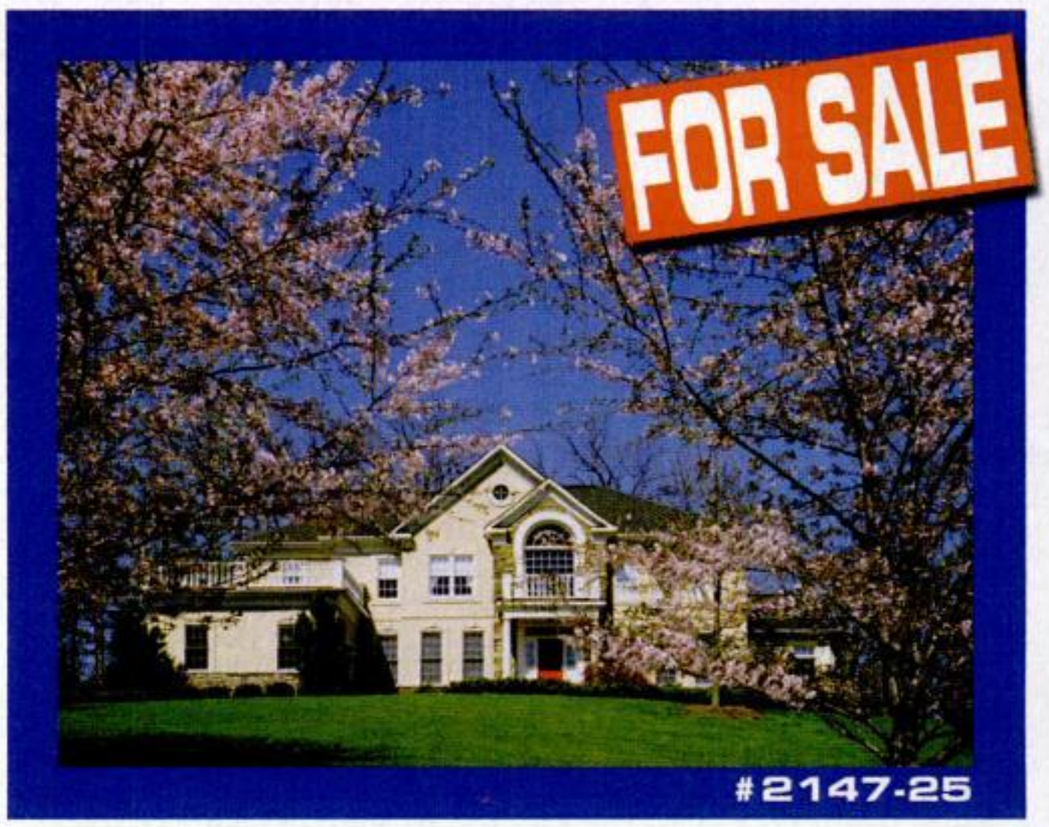
Specializing in estate homes

I Home I Local Listings I New Construction I Agents I Mortgage Calculator I

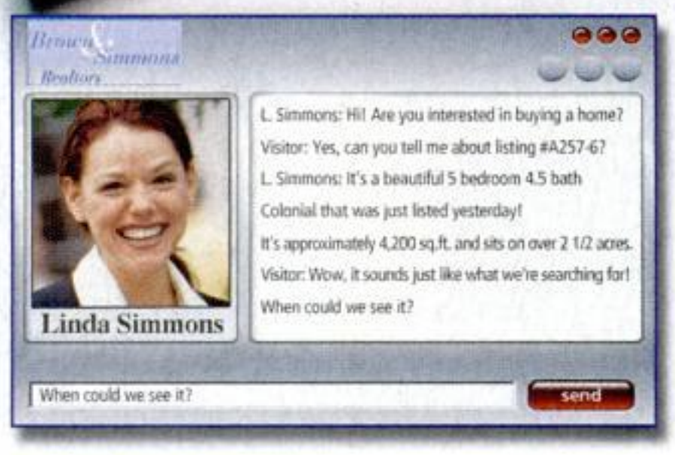
Welcome to Brown & Simmons, Realtors. We have been specializing in estate homes for over two generations.

From new construction to historic homes, we're here to help you and your family find the perfect home.

Questions?



I Home I Local Listings I Contact us I Newsletter Sign up I


Brown & Simmons Realtors
L. Simmons: Hi! Are you interested in buying a home?
Visitor: Yes, can you tell me about listing #A257-6?
L. Simmons: It's a beautiful 5 bedroom 4.5 bath Colonial that was just listed yesterday!
It's approximately 4,200 sq.ft. and sits on over 2 1/2 acres.
Visitor: Wow, it sounds just like what we're searching for!
When could we see it?
Linda Simmons
When could we see it?
send

In2site Live Dialogue lets you communicate with your site visitors live and in real time, making it an invaluable tool for sales, support and consulting professionals alike.

Contact
Name
Karen Anderson
Phone Number
877-461-2631
E-Mail
karen@karenanderson.us
Home Criteria
We are looking for a single home with at least 4 bedrooms, 2 1/2 baths and a nice sized yard for our 2 children and 2 dogs to play in. We prefer new construction.
Send

With **1&1 WebElements**, you can generate valuable feedback and collect qualified leads by adding template-driven contact forms, online polls, event registrations and more to your site.

Brown & Simmons Realtors
newsletter no.23
Dear Jim,
Welcome to the Monthly Update from Brown & Simmons, Realtors. This month, we have some really special properties to show you. You can call the office at any time to find out more details on these listings.
4 bedroom, 3 1/2 bath Stunner!
Built in 1997, this single family home is located in a charming neighborhood and sits on 1 acre of land. With approximately 4,200 square feet of living space, the home features a large deck from the kitchen, large eat-in kitchen, family room, formal living room, 2 fireplaces, hardwood floors throughout, skylights, soaking tub in the master bathroom, and loads more! This home is a must see!

The **1&1 Newsletter Tool** provides a cost-effective way to build and maintain relationships with your site visitors. Create your own mailing lists, manage recipients' addresses, track results and more.

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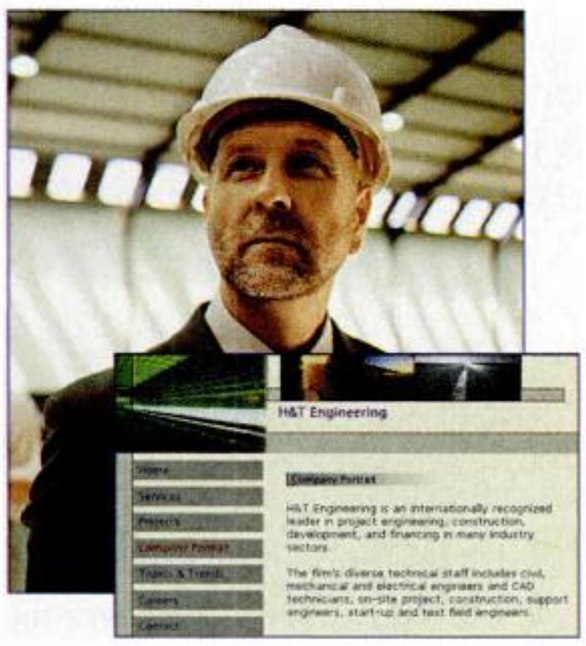
us the World's #1 Web Host.
to test drive 1&1!


H&T Engineering
Company Portrait
H&T Engineering is an internationally recognized leader in project engineering, construction, development, and financing in many industry sectors.
The firm's diverse technical staff includes civil, mechanical and electrical engineers and CAD technicians, on-site project, construction, support engineers, start-up and test field engineers.

It's easy!

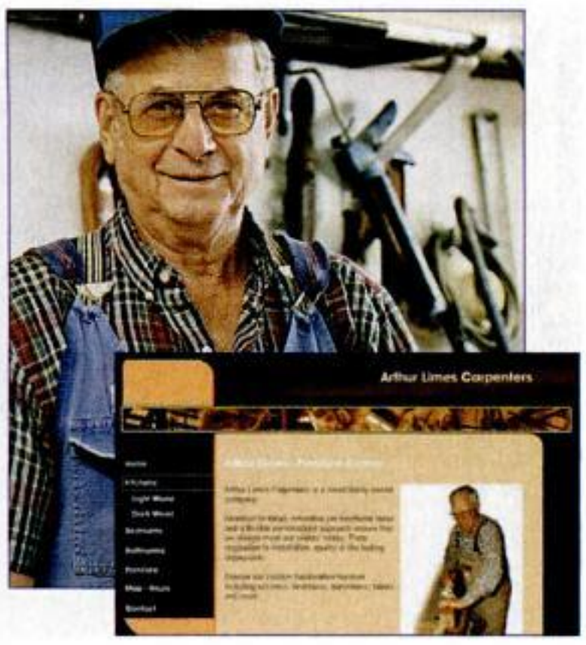
"I'm not a professional web designer, but with 1&1's included site-building tools I was able to create a professional-looking website in a short time and without any prior programming experience. I can't believe how easy it was for me to create my own high-impact web presence!"

Bruce Zachary, Engineer

It works!

"1&1 includes these great marketing tools that help me better communicate with my customers. I can see when someone comes to my site and converse with them right then and there! I can easily collect and manage my customers' data, and I can send e-mail newsletters announcing special offers."

Kelly Sloan, Salon Owner



It's free!

"When I heard about 1&1's previous test drive promotion, I decided to give web hosting a try. Turned out, a website was exactly what my business needed. I am able to showcase my work and attract new customers. Being able to test drive the package convinced me to stay with 1&1."

Arthur Limes, Carpenter

1&1

TEST DRIVE

2005

January 1 – April 24, 2005

OFFER EXTENDED!

Test drive the 1&1 BusinessPro Package – 1&1's most popular hosting plan – including all the professional tools you need!

- ✓ 6 Month FREE Trial!
- ✓ No Credit Card Required!
- ✓ No Strings Attached!
- ✓ 1 Domain Name Included!

1&1 began as a small business some years ago, so we understand your needs. If you're ready to move your business online but thought it would be too difficult or too large of an expense, turn to 1&1. Our hosting solutions are turnkey so you don't have to search for the features you need – they're all included! Even the design takes just minutes. And, the business packages starting at only $9.99 per month won't break your budget!

Now – for a limited time – you can get online with 1&1 with a no obligation, 6-month test drive of the 1&1 BusinessPro Package – 1&1's most popular hosting plan! Join the millions of small businesses who have already established a successful online presence with 1&1. Your free trial is just a click away. But hurry, this offer ends April 24, 2005!

FOR MORE DETAILS GO TO 1AND1.COM

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1&1 HOSTING

Affordable, all-inclusive, feature-packed hosting from 1&1.

1&1's Microsoft and Linux shared hosting packages offer the best value for your money. Whether you're a novice Internet user or operate a heavily trafficked site, 1&1 has a hosting package that will help you make the most of your web experience.

Home Package

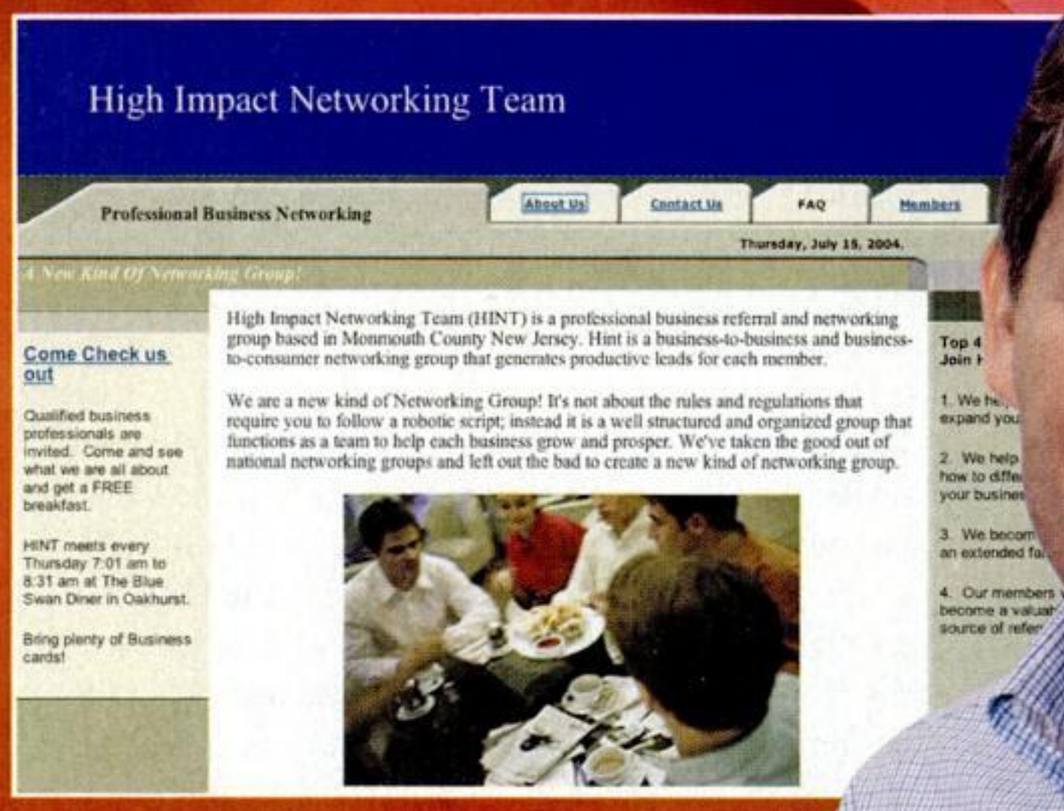
Ideal for creating your family website and publishing your photos or hobbies to the Internet.

Business Package

The easy way for small and medium-sized businesses to build a sophisticated, professional web presence. And now is the perfect time to get your business online with a 6 month FREE trial of the 1&1 BusinessPro Package! But hurry, this offer ends soon.

Developer Package

Packed with the latest Internet technologies to build powerful, secure and reliable web applications.


High Impact Networking Team
Professional Business Networking
About Us
Contact Us
FAQ
Members
Thursday, July 15, 2004.
A New Kind Of Networking Group!
Come Check us out
Qualified business professionals are invited. Come and see what we are all about and get a FREE breakfast.
HINT meets every Thursday 7:01 am to 8:31 am at The Blue Swan Diner in Oakhurst.
Bring plenty of Business cards!
High Impact Networking Team (HINT) is a professional business referral and networking group based in Monmouth County New Jersey. Hint is a business-to-business and business-to-consumer networking group that generates productive leads for each member.
We are a new kind of Networking Group! It's not about the rules and regulations that require you to follow a robotic script; instead it is a well structured and organized group that functions as a team to help each business grow and prosper. We've taken the good out of national networking groups and left out the bad to create a new kind of networking group.

$600 Productivity Software Suite INCLUDED*

*\$6.99 shipping & processing fee applies

"I have found 1&1's hosting services so exceptional that I purchased another Microsoft Hosting account. 1&1's services are so reliable and affordable that I plan on purchasing additional services as my business expands."

George Alto
www.HighImpactNetworking.com

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1&1 TEST DRIVE 2005

January 1 – April 24, 2005

OFFER EXTENDED!

Test drive the 1&1 BusinessPro Package featuring all the professional tools included with the most popular 1&1 Business Package!

- ✓ 6 Month FREE Trial!
- ✓ No Credit Card Required!
- ✓ No Strings Attached!
- ✓ 1 Domain Name Included!

MONEY BACK GUARANTEE

90-DAY MONEY BACK GUARANTEE

100% Satisfaction or your Money Back

HOME PACKAGE

$4.99 PER MONTH

No setup fee

INCLUDES 1 DOMAIN

PACKAGE FEATURES	🐧	🪟
Web space	1,000 MB	1,000 MB
Monthly transfer volume	25 GB	25 GB
FTP accounts	1	1
1&1 Control Panel	✓	✓
Logfiles	✓	✓
MARKETING TOOLS		
Chat channels	1	1
1&1 WebStatistics	✓	✓
SITE-BUILDING TOOLS		
PDF2Web Converter	✓	✓
DynamicSiteCreator	✓	✓
Graphic archive	✓	✓
WebsiteCreator	12 pages	12 pages
Software suite worth $600	✓	✓
FrontPage extensions	✓	✓
CGI library	✓	✓
Active Server Pages	–	✓
DOMAIN NAMES		
Included Domains	1	1
Subdomains	10	10
Run multiple independent sites	✓	✓
Full DNS management	✓	✓
E-MAIL		
E-mail accounts w/ 1 GB space each	200	200
Aliases, auto-responders, forwarding	✓	✓
1&1 WebMail	✓	✓
Spam filtering for all accounts	✓	✓
Virus protection for all accounts	✓	✓
SECURITY FEATURES		
Protected by up-to-date firewall	✓	✓
Daily backups	✓	✓
Password protected directories	✓	✓
Dedicated SSL Certificate	optional	optional
SUPPORT		
24/7 phone support	✓	✓
24/7 e-mail support	✓	✓

BUSINESS PACKAGE

$9.99 PER MONTH

No setup fee

INCLUDES 3 DOMAINS

PACKAGE FEATURES	🐧	🪟
Web space	2,000 MB	2,000 MB
Monthly transfer volume	50 GB	50 GB
FTP accounts	5	5
1&1 Control Panel	✓	✓
Logfiles	✓	✓
MARKETING TOOLS		
Chat channels	5	5
1&1 WebStatistics	✓	✓
In2site Live Dialogue	✓	✓
1&1 Newsletter Tool	✓	✓
1&1 WebElements	✓	✓
SITE-BUILDING TOOLS		
PDF2Web Converter	✓	✓
DynamicSiteCreator	✓	✓
Graphic archive	✓	✓
WebsiteCreator	18 pages	18 pages
Software suite worth $600	✓	✓
FrontPage extensions	✓	✓
CGI library	✓	✓
Active Server Pages	–	✓
Perl, PHP3, PHP4, and PHP5	✓	–
1&1 WebDatabase	✓	✓
Database	1 MySQL	MS Access
Cron Jobs	✓	–
SSI (Server side includes)	✓	✓
DOMAIN NAMES		
Included Domains	3	3
Subdomains	50	50
Run multiple independent sites	✓	✓
Full DNS management	✓	✓
E-MAIL		
E-mail accounts w/ 1 GB space each	500	500
Aliases, auto-responders, forwarding	✓	✓
1&1 WebMail	✓	✓
Spam filtering for all accounts	✓	✓
Virus protection for all accounts	✓	✓
SECURITY FEATURES		
Protected by up-to-date firewall	✓	✓
Daily backups	✓	✓
Password protected directories	✓	✓
SSH Secure Shell Access	✓	–
Dedicated SSL Certificate	optional	optional
SUPPORT		
24/7 phone support	✓	✓
24/7 e-mail support	✓	✓

DEVELOPER PACKAGE

$19.99 PER MONTH

No setup fee

INCLUDES 5 DOMAINS

PACKAGE FEATURES	🐧	🪟
Web space	4,000 MB	4,000 MB
Monthly transfer volume	100 GB	100 GB
FTP accounts	25	25
1&1 Control Panel	✓	✓
Logfiles	✓	✓
MARKETING TOOLS		
Chat channels	10	10
1&1 WebStatistics	✓	✓
In2site Live Dialogue	✓	✓
1&1 Newsletter Tool	✓	✓
1&1 WebElements	✓	✓
SITE-BUILDING TOOLS		
PDF2Web Converter	✓	✓
DynamicSiteCreator	✓	✓
Graphic archive	✓	✓
WebsiteCreator	25 pages	25 pages
Software suite worth $600	✓	✓
FrontPage extensions	✓	✓
CGI library	✓	✓
Active Server Pages	–	✓
ASP.NET, .NET Framework	–	✓
Perl, PHP3, PHP4, and PHP5	✓	–
1&1 WebDatabase	✓	✓
Database	3 MySQL	MS Access, MS SQL
Cron Jobs	✓	–
SSI (Server side includes)	✓	✓
Perl Script Output Monitor	✓	–
Perl Syntax Checker	✓	–
DOMAIN NAMES		
Included Domains	5	5
Subdomains	200	200
Run multiple independent sites	✓	✓
Full DNS management	✓	✓
E-MAIL		
E-mail accounts w/ 1 GB space each	1,000	1,000
Aliases, auto-responders, forwarding	✓	✓
1&1 WebMail	✓	✓
Spam filtering for all accounts	✓	✓
Virus protection for all accounts	✓	✓
SECURITY FEATURES		
Protected by up-to-date firewall	✓	✓
Daily backups	✓	✓
Password protected directories	✓	✓
SSH Secure Shell Access	✓	–
Dedicated SSL Certificate	✓	✓
SUPPORT		
24/7 phone support	✓	✓
24/7 e-mail support	✓	✓

🐧 – Linux packages 🪟 – Microsoft packages

FOR MORE DETAILS GO TO **1AND1.COM**

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CREATE YOUR WEB

Easily build your web presence with the latest software and online tools from 1&1. When you sign up for any 1&1 shared hosting plan, we include four ways for you to create your site – WebsiteCreator, DynamicSiteCreator, PDF2Web Converter, or 1&1's exclusive software suite. Or, you can design your site using your favorite web editing software!

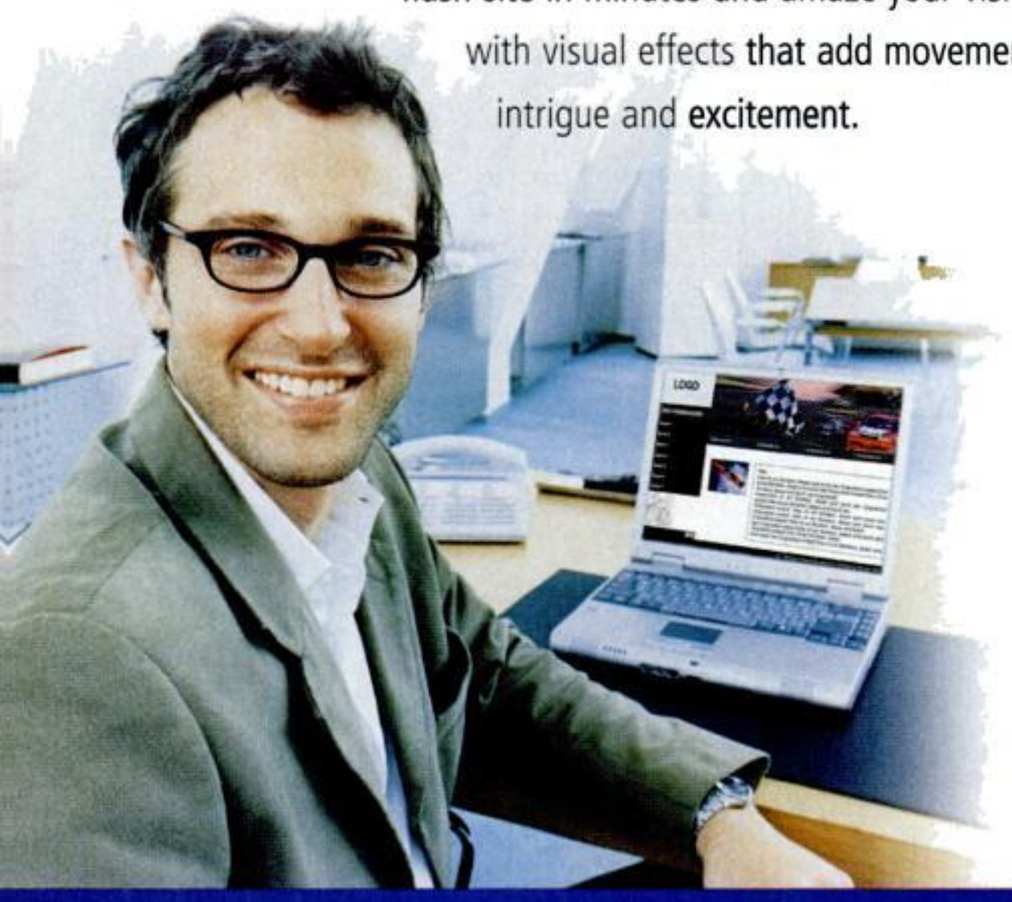
WebsiteCreator

Choose from 120 professionally designed templates and build an HTML website without any HTML knowledge! And with the 5-step wizard, your site can be online in just 20 minutes. Best of all, website management is a breeze – edit and update your site as often as you like.

Tying the Knot
Home
Sample Album
Hobbies
Contact
Interesting Links
Welcome to Tying the Knot!
When you think about planning your special day, let the professionals at Tying the Knot turn your dream wedding into a reality. Let us take care of everything! We'll help you
Step 2: Refine your Design
Step 1: Choose your layout
Create a professional site with no programming hassles

DynamicSiteCreator

Let animation take your site from the ordinary into the extraordinary. With the sensational new DynamicSiteCreator from 1&1, building flash sites is simple – at last! Easily create a flash site in minutes and amaze your visitors with visual effects that add movement, intrigue and excitement.



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SITE

Bonus Software Productivity Suite – $600 Value

Create, publish, promote and optimize your ideal website with full versions of NetObjects Fusion 8, PhotoImpact XL SE, search engine tools and more. Plus, you'll receive the 1&1 software collection, packed with browsers, media players and other tools for maximizing your web presence. All at no additional cost!*

PDF2Web Converter

Do you wish you could turn your PDF brochure into a fully functioning website? Now you can with the new PDF2Web Converter from 1&1. Novices and advanced users alike can quickly and easily convert PDF files into professional-quality web pages with just a few clicks of the mouse!

... to PDF2Web Converter ...
From a print brochure ...
Ocean Resort
... to your own website!
Turn your company's brochures into fully functioning web pages

*$6.99 shipping and processing fee applies

FOR MORE DETAILS GO TO 1AND1.COM

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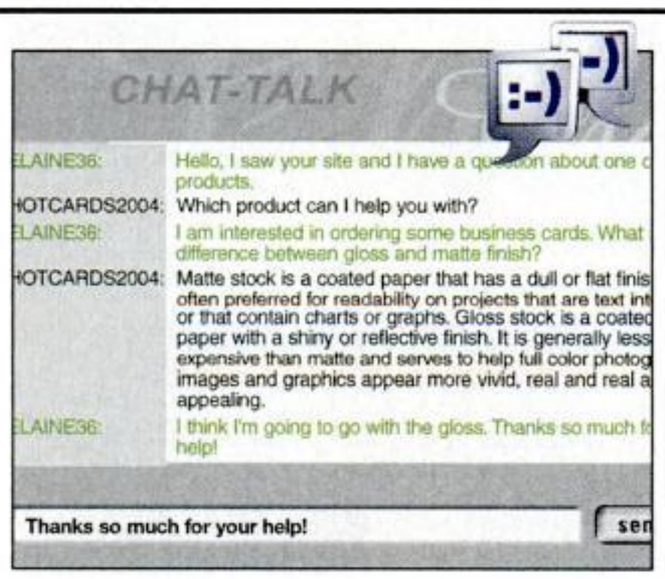
MARKET YOUR WE

Make your site interactive and increase communication with 1&1.

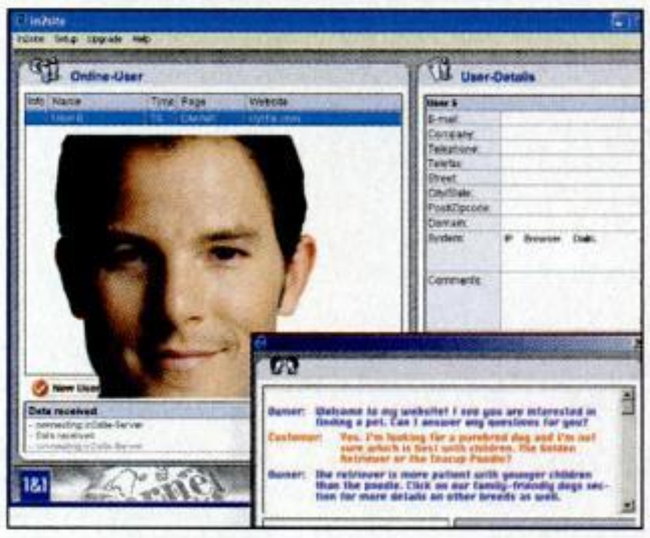
1&1 gives you the tools that let you effectively communicate with your customers and site visitors, keep them interested and keep them coming back for more. Your shared hosting package comes complete with high-performance features that let you connect with your visitors through live interaction, feedback forms, e-mail newsletters and more. Best of all, these tools are so easy to use that no programming knowledge is needed!

ALL WEB TOOLS INCLUDED
with Business & Developer shared hosting packages!*


CHAT-TALK
ELAINE36: Hello, I saw your site and I have a question about one
products.
HOTCARDS2004: Which product can I help you with?
ELAINE36: I am interested in ordering some business cards. What
difference between gloss and matte finish?
HOTCARDS2004: Matte stock is a coated paper that has a dull or flat finis
often preferred for readability on projects that are text int
or that contain charts or graphs. Gloss stock is a coated
paper with a shiny or reflective finish. It is generally less
expensive than matte and serves to help full color photog
images and graphics appear more vivid, real and real a
appealing.
ELAINE36: I think I'm going to go with the gloss. Thanks so much f
help!
Thanks so much for your help!

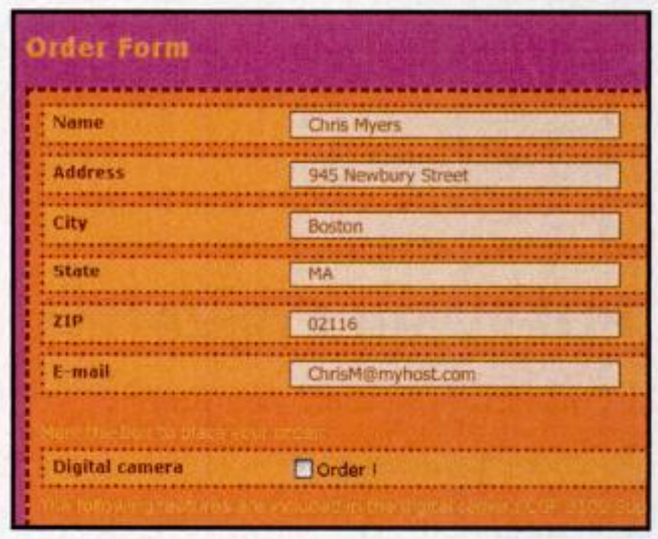
Chat Channels

Provide a meeting place for your customers and add entertainment value to your site. Unlike other chat programs, with Chat Channels your guests won't have to download any software, so they can check in from anywhere. And, your users won't be bombarded with advertisements! What you get is a place to talk to others with no added hassles.



In2site Live Dialogue

Wouldn't it be great if you could chat to your visitors while they are using your website – live and in real time? You can with In2site Live Dialogue from 1&1! In2site Live Dialogue allows for quick and easy communication with your visitors, making it an invaluable tool for sales, support and consulting professionals.



1&1 WebElements

Adding template-driven contact forms, online polls, event registrations and more to your site is a breeze with 1&1 WebElements. Adapt the templates to fit your site or be creative and easily build your own forms for any purpose! The information that your visitors enter is saved in a special Internet database, so you can view the results at any time.

*Chat Channels and 1&1 WebStatistics are included with Home packages

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BSITE

YOUR LOGO
newsletter
Let the 1&1 Newsletter Tool help you build and maintain a relationship with your visitors via e-mail newsletters. An ideal way to keep your customers up-to-date about your newest products, exciting finds and upcoming events, e-mail newsletters keep them coming back for more!
How does it work?
To access the Newsletter Tool, simply login to your Control Panel and you're just steps away from communicating with your website visitors more easily than ever before. And since the 1&1 Newsletter Tool is browser-based and launches right from your Control Panel, there's no software to install.
When you're ready to build an e-mail newsletter, editing tools and built-in design templates let you create professional looking e-mails quickly and with no programming knowledge. Then check your completed newsletter in test mode and click send!
We even include tools to build your own mailing list! Simply incorporate a template-driven subscription form on your site so interested visitors can quickly request to receive your e-mail newsletters. Once the form is submitted, the data is automatically entered into a

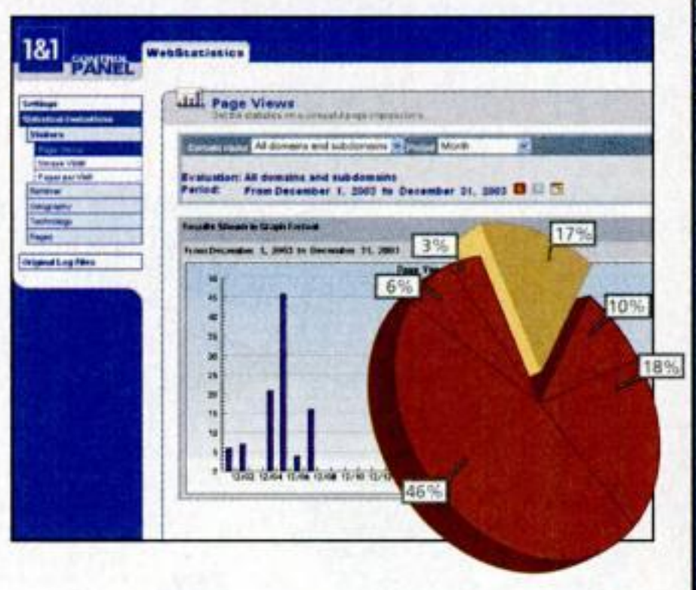
1&1 Newsletter Tool

E-mail newsletters provide an easy, cost-effective way to build and maintain relationships with your site visitors. The 1&1 Newsletter Tool lets you create and send professional-looking e-mails – with no programming hassles! You'll get everything you need to build your own mailing list, manage recipients' addresses, track results and more.

Membership List
Alan Bishop 634 E. 39th Street, New York, NY 10019 alanb@myhost.com
Stephen Bradshaw 1954 Corgin Street, Hudson, OH 44236 bradshaws@myhost.cor
Catherine Leonard 64 Stanhope Drive, Pittsburgh, PA 15237 family@ myname.com
Carl Brown 653 Liberty Avenue, Wilmington, NC 28403 brownc2521@lycos.com
Tom Stowe 26 N. Hills Road, Chandler, AZ 85226 webunited@gmx.net
Helen McSweeny 817 Providence Hwy, Boston, MA 02116 helenmcsweeney@hot-mail.com

1&1 WebDatabase

1&1 takes the guesswork out of gathering, organizing, displaying, and maintaining large amounts of information with the 1&1 WebDatabase. Setup is a breeze! Simply select a template in the database building kit. Or customize your own database – just click the fields you'd like to include and you're ready to go!



1&1 WebStatistics

Understand visitor dynamics with 1&1 WebStatistics. Gather all of the information you need and generate a detailed analysis of how your website is performing. Display the information in the format you choose – pie charts, bar graphs, or simple numeric output. Use the data to improve navigation and maximize the success of your site!

FOR MORE DETAILS GO TO **1AND1.COM**

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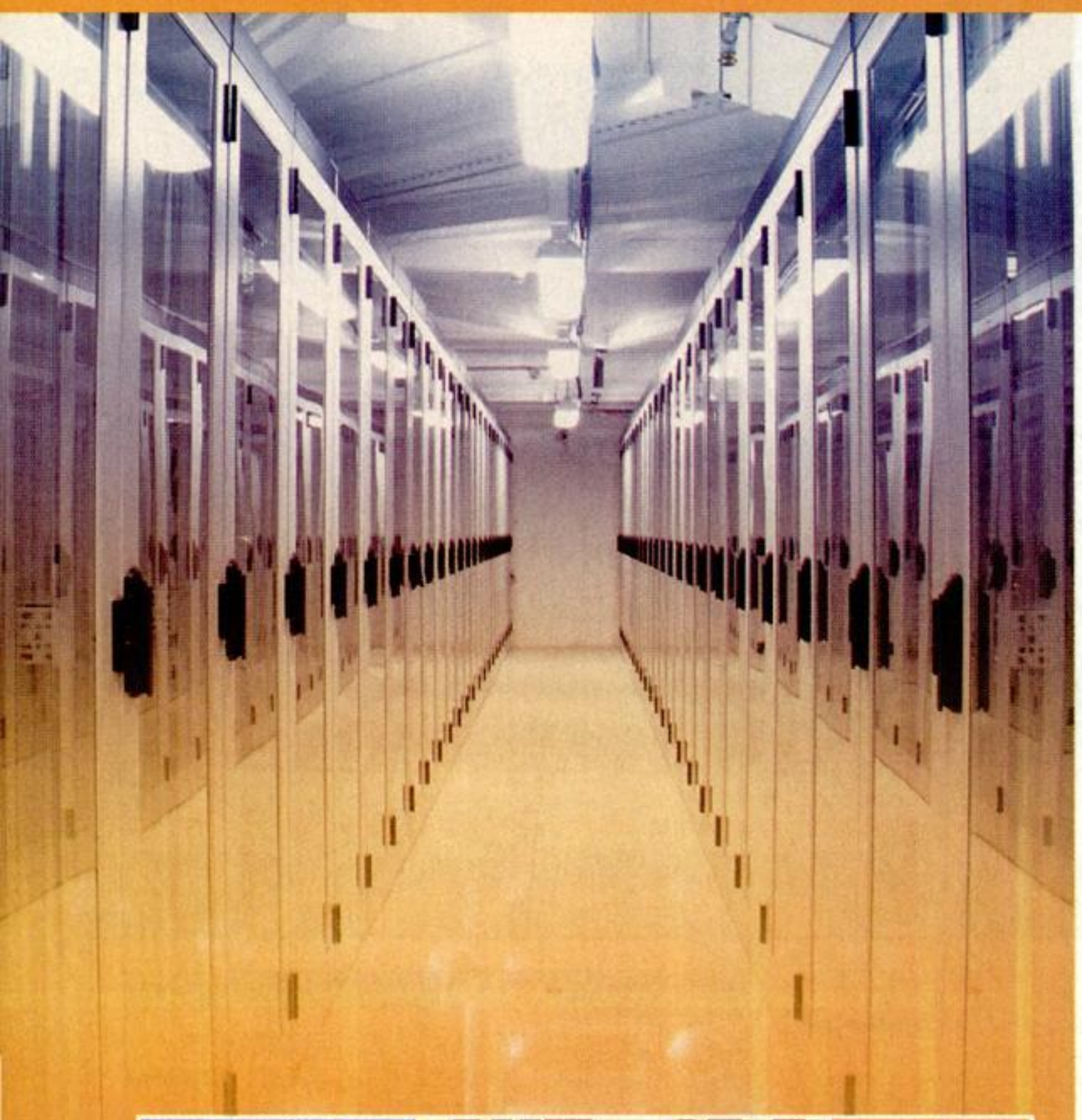
1&1 SERVERS



1&1 Dedicated Servers – Delivering More Than Ever!

Take your web presence to the next level! 1&1 Root Servers and 1&1 Windows Server 2003 put you in the driver's seat with total control. Or sign up for a 1&1 Managed Server and let 1&1 handle all the server maintenance and administration. And now, you can accomplish more than ever online with more included features, more power, and more value for your money.

More Server Power

All 1&1 Servers have been powered up with boosted bandwidth of up to 1,500 GB and memory upgrade of up to 2,048 GB DDR-RAM.

NEW! 1&1 Firewall

Based on Cisco hardware, this fully configurable security feature helps prevent attacks by filtering traffic before it even reaches your server.

Backup – No Extra Charge

Backup space matches your server's hard drive size so you can backup and protect all of your data. And, you pay nothing extra!

GeoTrust Dedicated SSL Certificate

An original GeoTrust Dedicated SSL Certificate is now included with all 1&1 Servers. Additional certificates can be purchased from 1&1 for just $49 per year.

NEW! Serial Console

Through the SSH client, you can gain access to your server even if the network connection is interrupted.

NEW! 1&1 Root Server: Re-image

If the pre-installed operating system doesn't meet your needs, you can choose another pre-configured, Linux-based operating system and install it through the 1&1 Control Panel.

NEW! 1&1 Windows Server 2003: Rescue Image

Repair and restore damaged systems via a Java-compatible browser or VNC client.

Additional Bandwidth – Price Reduced

1&1 includes a generous amount of monthly transfer volume. Should you exceed the limit, additional bandwidth is now available at half the price – just $0.49/GB!

"Moving to 1&1's Managed Server III has made our business much more efficient. 1&1 gives us our own dedicated server, but we still get the seamless, maintenance-free service of a shared hosting site. Plus, we get all the space we need for our high resolution graphics files and print samples."

Nikki Woodruff
www.hotcards.com

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$600 Productivity Software Suite INCLUDED*

1&1 ROOT SERVERS

For Maximum Flexibility and Control

- Plesk 7.5 Reloaded pre-installed
- Operating System: Fedora Core 2 Linux
- Recovery Tool: Smart reboot and restore capabilities
- 24/7 phone support

PLESK 7.5 RELOADED

1&1 MANAGED SERVERS

For Performance and Convenience

- Enjoy the features and ease of shared hosting with the power of a dedicated server
- Management, administration and maintenance by 1&1
- Easy administration through the 1&1 Control Panel
- 24/7 phone support

1&1 WINDOWS SERVER 2003

For Security and Reliability

- Windows Server 2003 Standard Edition with Server III (Web Edition with Server I & II)
- MSDE pre-installed
- .NET Framework already integrated
- 24/7 phone support

SERVER I ■ Intel Celeron 2.0 GHz ■ 512 MB DDR-RAM ■ 80 GB IDE hard drive ■ 1,000 GB monthly transfer volume	$69 PER MONTH	$79 PER MONTH	$89 PER MONTH
SERVER II ■ Intel Pentium 4, 2.4 GHz ■ 1,024 MB DDR-RAM ■ 80 GB IDE hard drive ■ 1,200 GB monthly transfer volume	$89 PER MONTH	$99 PER MONTH	$109 PER MONTH
SERVER III ■ Intel Pentium 4, 3.06 GHz Processor with Hyper-Threading ■ 2,048 MB DDR-RAM ■ 120 GB IDE hard drive ■ 1,500 GB monthly transfer volume	$119 PER MONTH	$129 PER MONTH	$149 PER MONTH

*$6.99 shipping & processing fee applies
$99 one-time setup fee

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1&1 eSHOPS

Easy, yet sophisticated e-commerce solutions.

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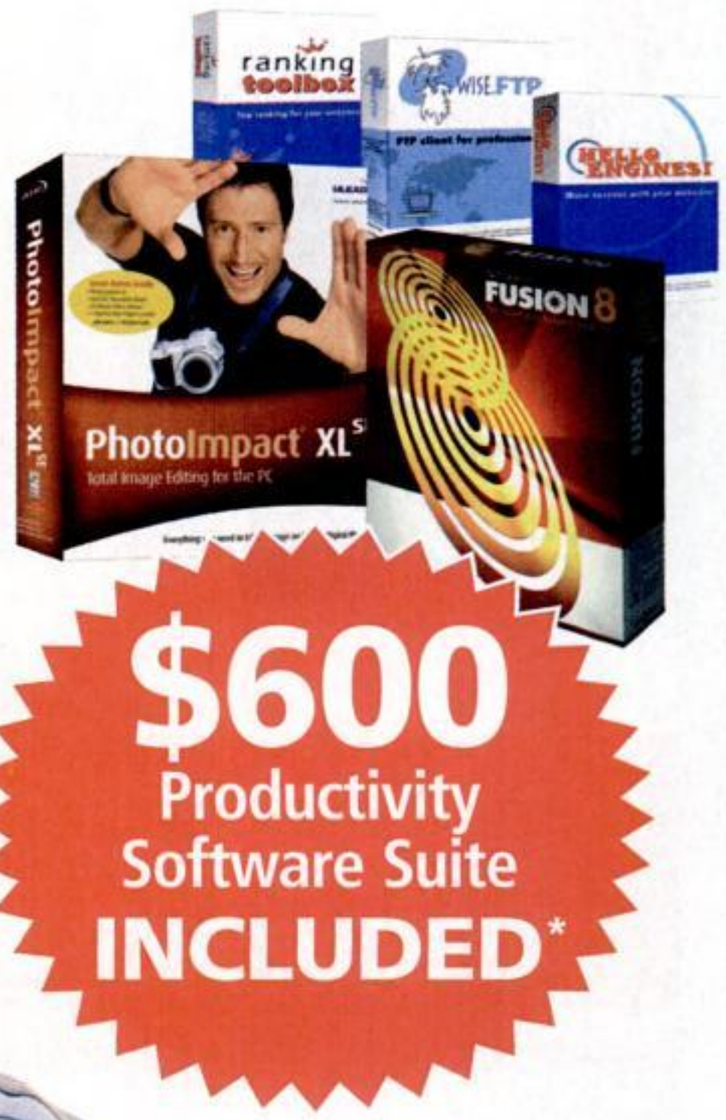

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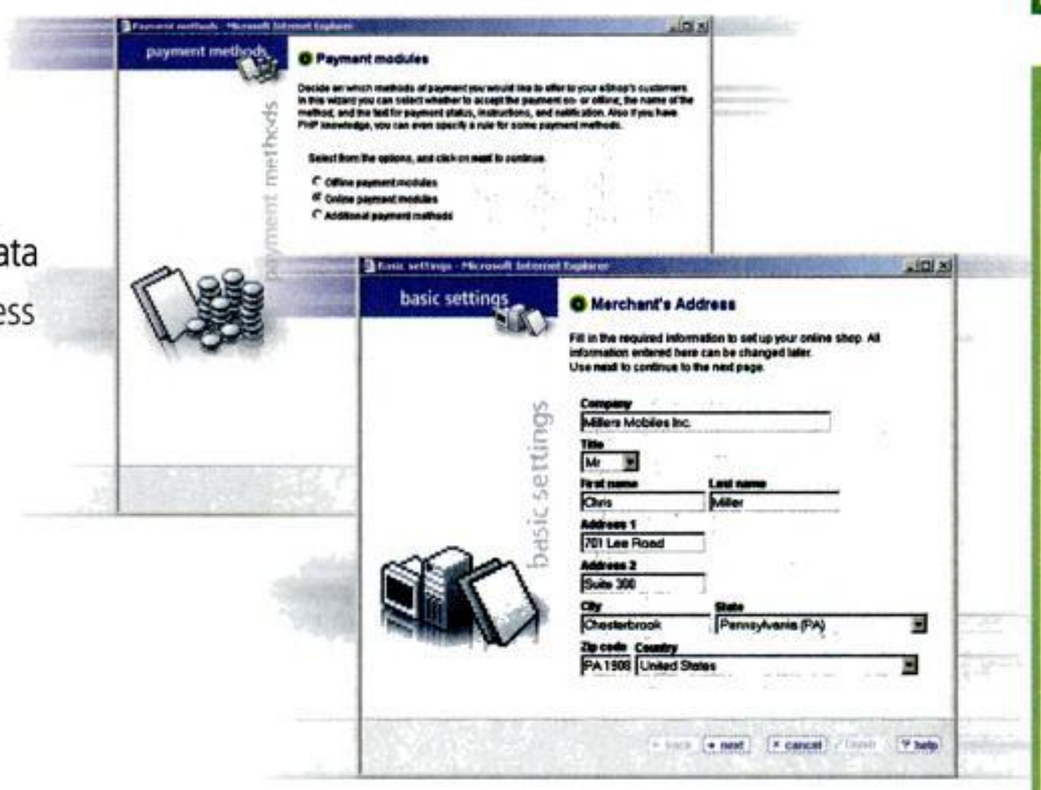

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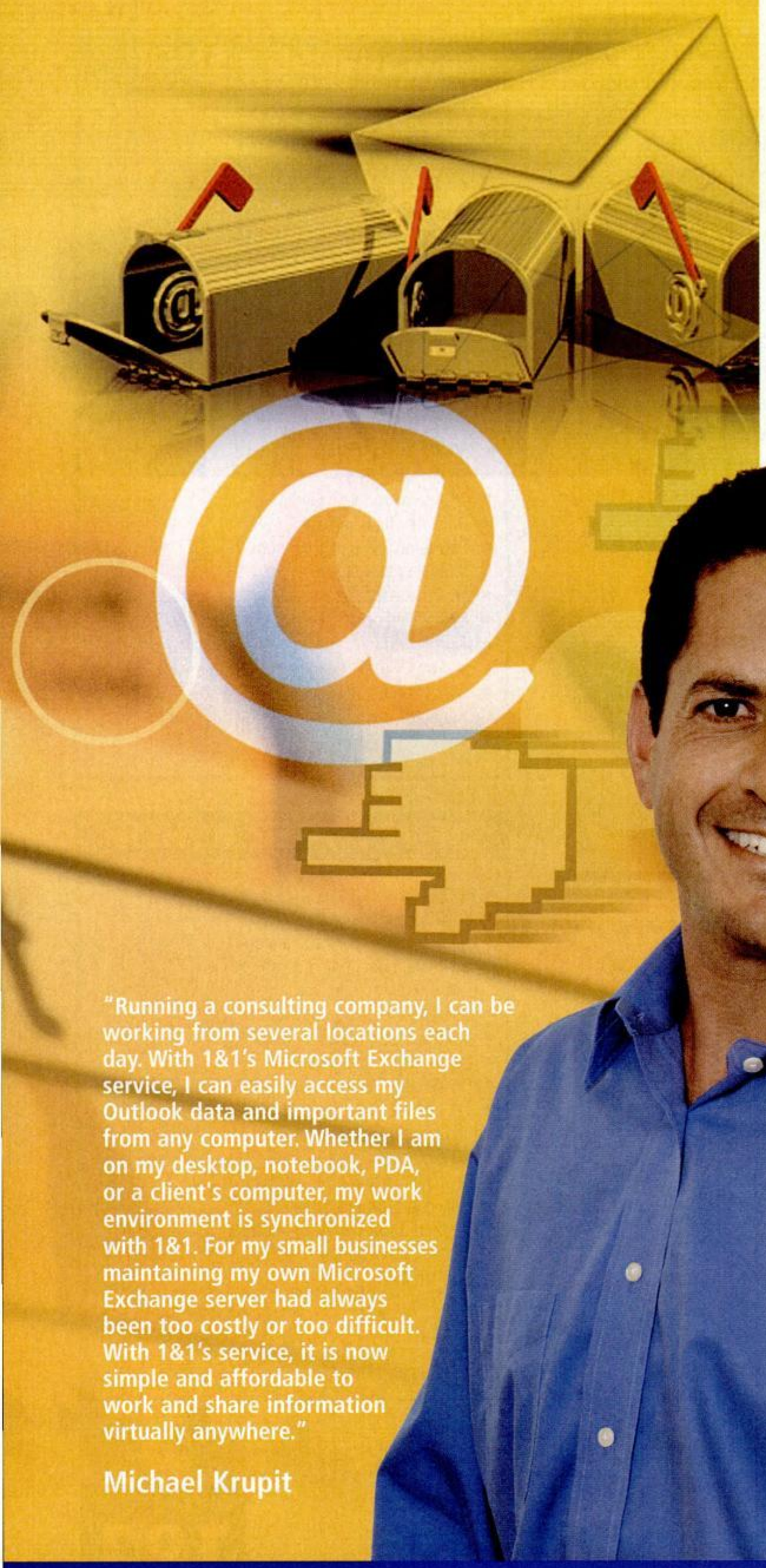

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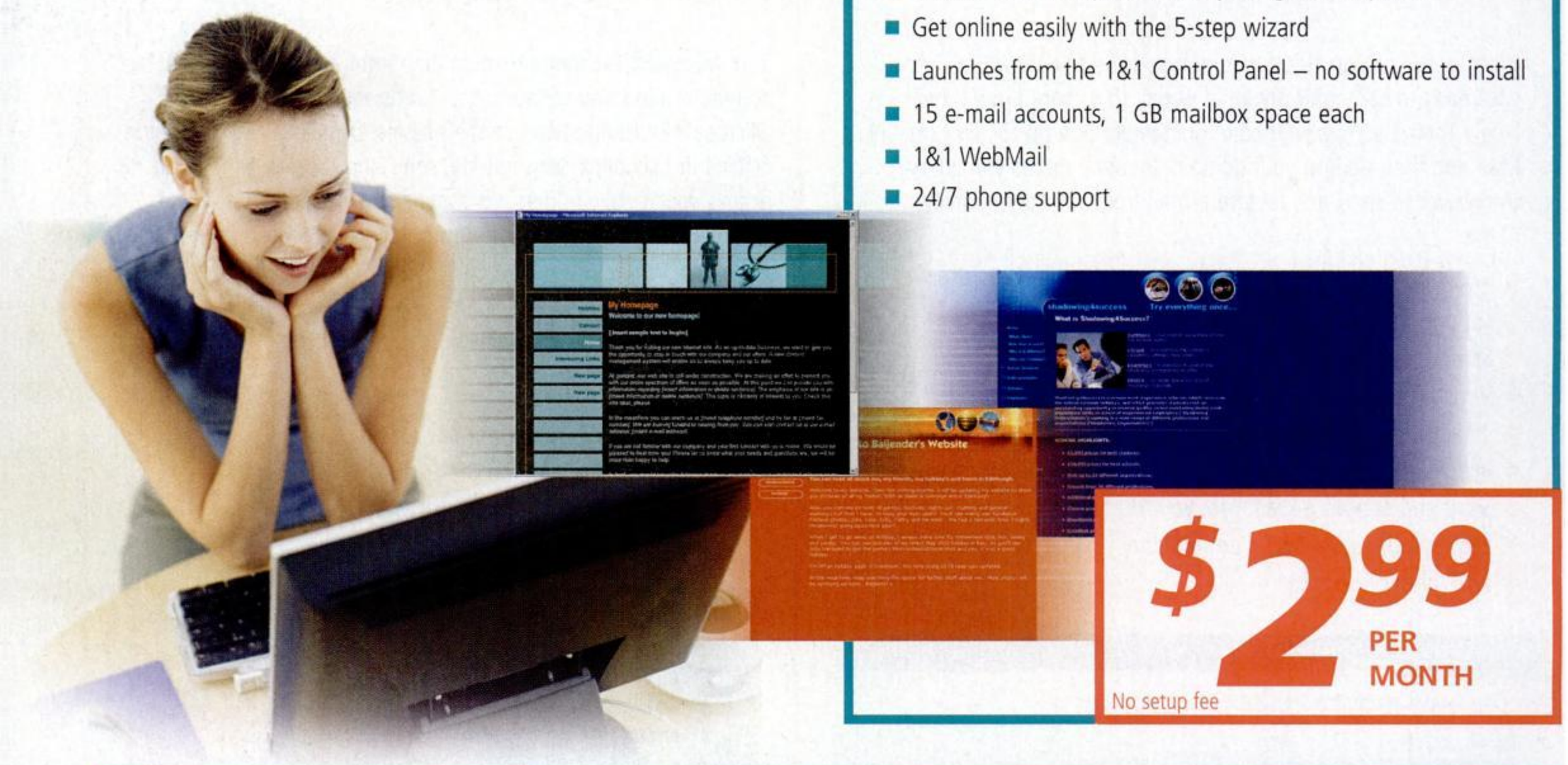

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Radio-Free Altec Lansing

DEAR DOG: I recently purchased an Altec Lansing VS3121 speaker system. I've noticed that the speakers pick up a faint buzz and some radio signals. I disconnected the speaker set and moved to the power outlet in my dining room, far from any electrical appliance or computer. The buzz and radio signals are still audible. Is this a common problem with these speakers? Is there a quick fix?

—H. GOLDSTEIN

The Dog spoke with Altec Lansing officials who said, "Altec Lansing has recently received a few customer complaints of VS3121 systems buzzing or picking up radio signals. While we have been unable to duplicate the condition, we are actively investigating this issue." Officials said consumers with the interference problems should call Altec Lansing at 800.258.3288. If the problem cannot be solved over the phone, Altec Lansing will replace the speakers, provided they are still within the one-year warranty period.

Altec Lansing said a few consumers have picked up errant radio stations on its VS3121 speakers.

FTC Gets Tough on Bad Rebates

In what amounts to a shot across the bow of retailers everywhere, the Federal Trade Commission has forced CompUSA to pay the rebates for one of its errant vendors.

CompUSA has agreed to fulfill advertised rebates for consumers who purchased QPS equipment. The FTC alleged that CompUSA engaged in deceptive and unfair practices in both the QPS rebate program, which the store had a hand in crafting, as well as the rebates on some of its own CompUSA-branded goods.

You're mucking with the G here. The FTC caned CompUSA and QPS for allegedly poor rebate fulfillment.

The FTC said CompUSA's ads claimed that consumers who purchased QPS hardware would receive rebates within six to eight weeks, or within a reasonable time period. But in some cases it took as long as six months to receive checks, and some consumers never received rebates at all. The FTC settlement is unique because it holds CompUSA responsible for the poor rebate fulfillment of a vendor. QPS subsequently filed for bankruptcy protection.

The settlement isn't just a wrist slap either. Under the settlement, CompUSA will pay all valid QPS rebates, which are past due and worth from $15 to $100. For the next 20 years, CompUSA must also conduct financial analysis of its vendors who don't have established track records to ensure they make good on their rebate promises. The company is also on a tight leash for the next 20 years to make sure rebates are paid in a timely manner. CompUSA officials declined to comment on the settlement.

The owners of QPS—Prita and Rajeev Sharma—aren't off the hook, either. The couple agreed to police their own rebate habits for the next 20 years if they ever pull QPS out of bankruptcy or start a new company in the future where rebates are offered.

Does this signal a more aggressive stance by the government regarding rebates? The Dog thinks so, judging by statements made by FTC Chairman Deborah Platt Majoras to the Consumer Federation of America in March: "The message to retailers should be clear: If you promise to provide a rebate of your own, you must honor that promise in a timely manner," Majoras said. "Even if you are advertising someone else's rebate program, you may not turn a blind eye when that company fails to honor its rebates. If you wish to continue advertising that company's rebates, you must take reasonable steps to assure that consumers get the promised rebates."

Amen, sister. The G's butt-biting move is long overdue. For years, tech consumers have had to deal with excessive waits or no rebates at all, due to mysteriously "missing" documents or roadblocks thrown up to prevent consumers from properly filing. If you are having such a problem collecting on a rebate, report it to the FTC (www.ftc.gov). The agency ultimately took action against CompUSA after seeing a pattern of abuse and complaints. The FTC received roughly 2,000 complaints regarding technology products in 2003, and about 25 percent were rebate related. Woof. ■

Got a bone to pick with a vendor? Been spiked by a fly-by-night operation? Sic The Dog on them by writing **watchdog@maximumpc.com**. The Dog promises to get to as many letters as possible, but only has four paws to work with.

RECALL ALERT

Microsoft is recalling some 14.1 million Xbox console power cords, which pose a fire hazard. The company has received 30 complaints of minor injury or property damage resulting from the bad cords. Seven people have reported that the power cord overheated and burned their hands, while others said the cord caused smoke damage and other heat-related property damage.

For U.S. consumers, only Xbox consoles made before October 23, 2003 require the new cable. In Europe, consoles made before January 13, 2004 require the new cable. Microsoft says it will take two to four weeks for a replacement to arrive, in the meantime, the company says gamers should turn off the Xbox when not in use. Use of a surge protector or power strip will not decrease the possibility of the cable overheating. For more information and to obtain a new cable, visit: **http://replacements.webprogram.com/en-us/index.asp** or call 866.271.0450.

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MMORPG

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AN ALL-LAMES MASSIVELY MULTIPLAYER ROUNDUP

BY WILL SMITH

Your party has stalked the dreaded dragon Azuregos through Azshara for more than 30 minutes, waiting for the perfect moment to mount an attack. As you prepare to make your move, you spot a party of night elves in the distance. Do you attack the elves, slay the dragon, or run away like a pack of frightened schoolgirls? In massively multiplayer games, the choice is yours.

Unlike a single-player game, where all the characters you encounter are computer-controlled automata, many of the characters in MMO games are real human beings, living in all regions of the world. The people you're adventuring with—and battling against—might live

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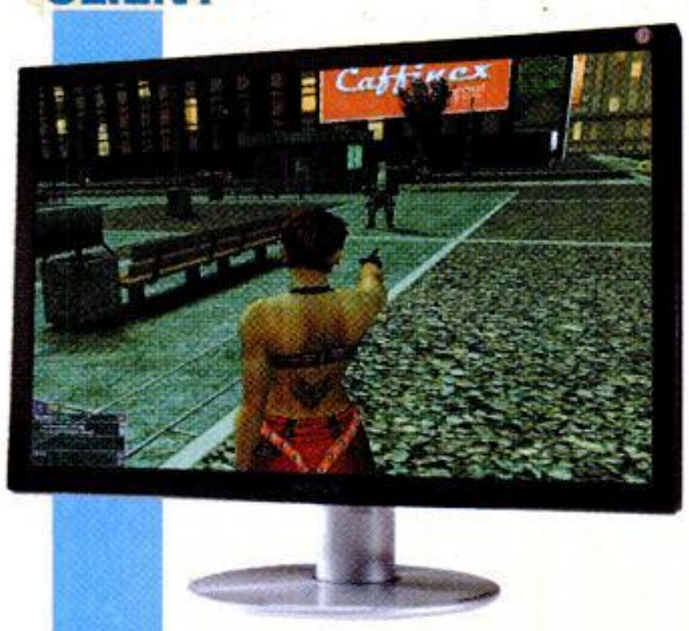
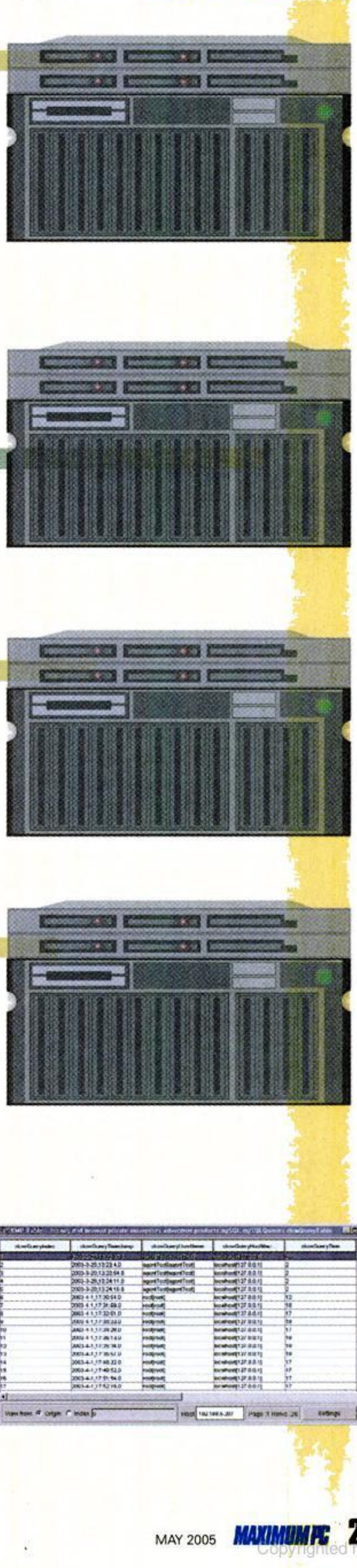
FIVE TICKS IN THE MATRIX ONLINE

Even something as seemingly simple as killing a single mob—a computer controlled enemy—requires lots of communication back and forth between server and client machines. Here's how a simple one-on-one fight works in *The Matrix Online*. As you add more players—or monsters—the fight grows ever more complex.



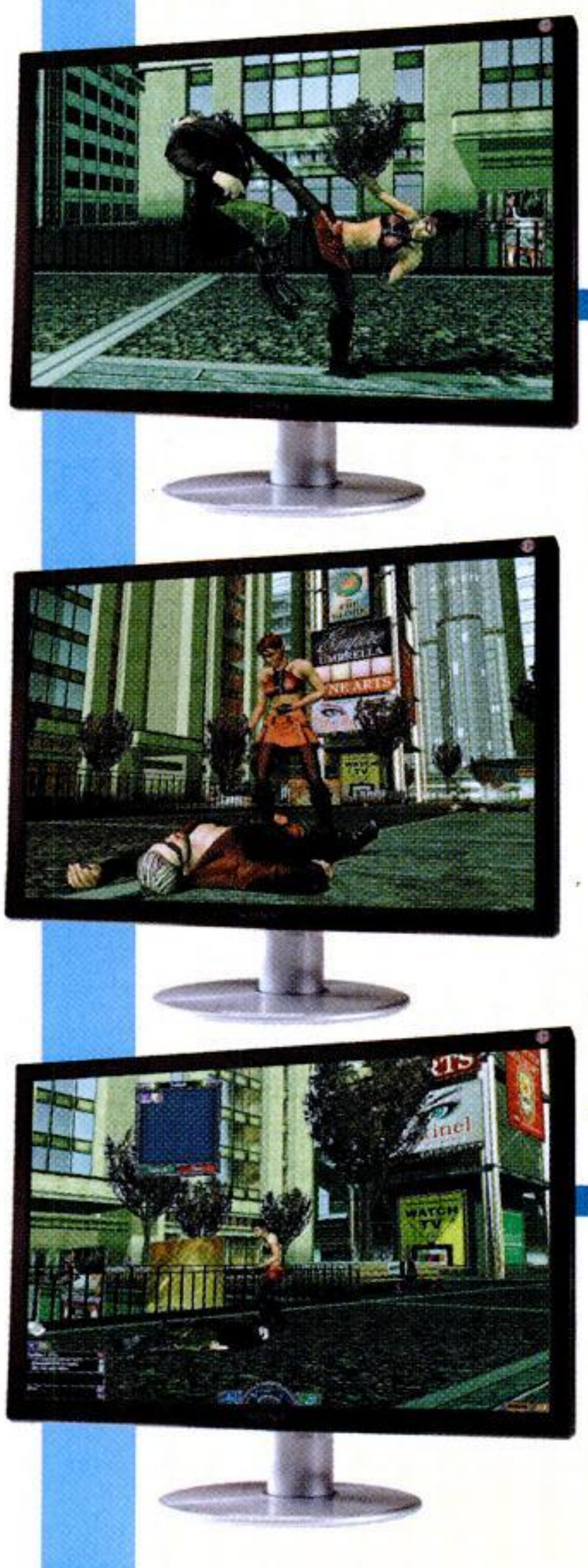
CLIENT



ZONE SERVER

The zone server's job is to keep track of all the players and all the non-player characters (NPCs) in a specific area. In this case, the zone server tells you, the player, there's an enemy nearby.

Say you decide to attack the mob and you press the attack key. Your machine sends a message to the server. Then the server pulls information about the monster—the number of hit points it has, and attacks it can use—from the database server.



As you fight, the server calculates the damage the mob does to you, and that you do to the mob. When you activate special attacks, skills, or healing powers, your PC informs the server of your actions.

Eventually, you either kill the mob or die. If you win the fight, the server sends a message to the client machine, which tells it to play the monster's death animation. The server calculates the experience gain for killing this particular monster, and adds the gain to your character's experience table on the database server.

To the victor go the spoils! Once you vanquish the enemy, you can grab whatever loot it was carrying. The server tells the client what loot is on the corpse, and the player has the option to "pick up" any items he wants. All he's really doing is copying that item to his character's database entry.

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monsters. And once the monsters have been created, their attacks are fine-tuned to difficulties appropriate to the level of the zone. Merchants must be designed, and their shops stocked with goods for wayfaring adventurers to purchase. Quests must be written, and dungeons must be filled. But the excitement for many MMO players lies not in the grind—leveling- and gearing-up your character—but in the challenge of boss encounters.

BOSS ENCOUNTERS—WHAT'S THE BIG DEAL?

You can play the majority of a game such as *World of Warcraft* as if it were a single-player game that just happens to be equipped with an excellent chat client; that is, you can adventure and level-up either by yourself or in small groups. Once you reach the higher levels, you can begin exploring what's known as "raid" content. While a group is just a few people in the game (five or six, say), a raid party (or raid, for short) is a group of groups (as many as 72 people, in some games). Raids come together to accomplish one simple goal: to kill ferocious monsters that would turn a single player or even a small group into adventurer jelly.

Figuring out how to beat each boss encounter is a puzzle for you and your friends to solve. Boss monsters usually have special skills and attacks, which can present unique challenges. While you can sometimes use a brute-force approach—simply kill the boss before he kills everyone in your raid—there's usually a smarter way. If, for example, a boss monster is capable of casting a powerful spell that damages everyone in close proximity, the best approach is probably to kill him from afar, using magic and ranged weapons. As your raid advances through the game, the boss encounters become more complex, involve more monsters, and generally require more coordination among your cohorts.

On the developer side, orchestrating these high-end raid encounters is a tricky business: Make them too difficult, and gamers will become frustrated and angry; make them too easy, and they won't be any fun. Building good raid content is a constant balancing act that requires lots of testing and tweaking. The quality of a game's raid content is one of the things that will either attract players to a particular game or run them off.

THE ECONOMICS OF MMO

So you have a server with enough people to populate a small town, and the people are collecting lots of loot and trading it for the realm's currency. Sounds pretty simple, right? After all, the developer controls how much everything costs and how much NPC vendors pay for commodities, right? Yes, but there's a kink: Players can also use items that drop from mobs to create goods that *other* players want and need.

The fact that an official currency exists, and that players can harvest resources from the world and convert them into other in-demand resources, means that many MMO games have working economies. In fact, bona fide economists are studying these simplistic systems in an effort to better understand →

TRIVIA: TICKS

Unlike twitch games, MMO games don't require constant communication between the server and clients; in fact, most effects are applied only every few seconds. This time span is known as a "tick," and it's usually about six seconds in length.

TRIVIA: RESISTANCE

Players fed up with perceived class imbalances frequently take to the streets to protest—naked! The first such protest occurred in *Ultima Online*, but we've even seen such activism in *World of Warcraft*, as well.

The next *City of Heroes* expansion pits costume-clad superheroes against evil antagonists in the battle for Paragon City.

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MMORPG

MASSIVELY MULTIPLAYER ONLINE ROLE PLAYING GAMES

the workings of supply and demand in the real world.

Back in the game world, meanwhile, a clever player can earn tons of in-game money simply by analyzing the supply and demand for popular items. Most modern games include some sort of in-game auction or brokerage house, where—for a small fee—players can post items for sale. These transactions can be concluded whether the seller is logged into the game or riding the subway to his or her real job.

MMO economies can also be plagued by many of the same problems that impact real-world economies. Hyper-inflation triggered by money-duping exploits has occurred in almost every game to date. Unlike the real world, however, solutions are fairly easy to come by. The developer of one game absorbed the excess cash by creating a casino area in which players could gamble for rare loot; other developers have offered unique clothing or exotic hairstyles in exchange for large sums of money.

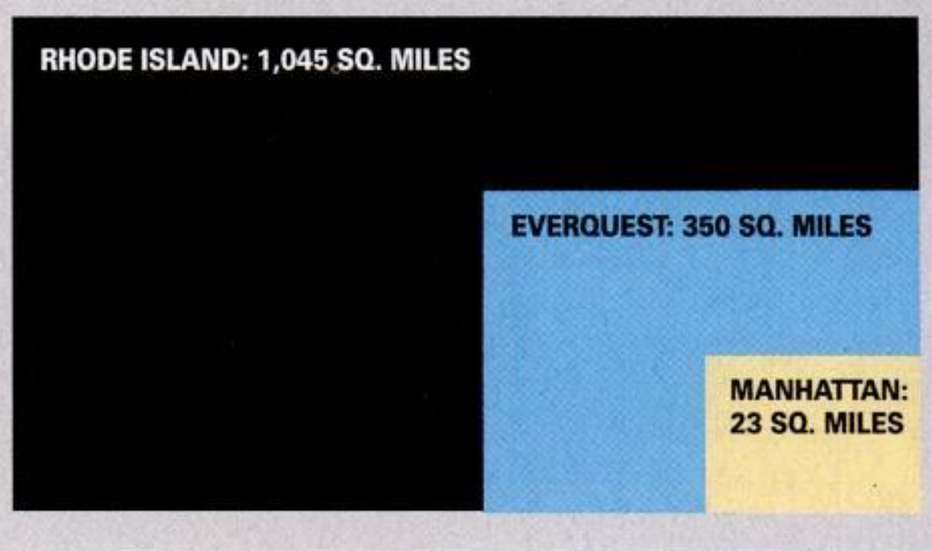
THE FUTURE OF MMO

Despite the insane cost of development—some current MMO games are rumored to have cost $40 million—there's a bright future for MMO games. Even low-profile MMO games can be very profitable; most MMO games cost the same at retail as traditional games, but they have the added benefit of putting monthly subscription fees straight into the publisher's pockets. In development right now are MMO games based on the *Star Trek*, *The Matrix*, and *Lord of the Rings* franchises, as well as high-profile projects from the creators of *EverQuest* and *Ultima Online*.

The MMO fun is just beginning! ■

TRIVIA: EVERQUEST'S LANDMASS

MMO games are big. Really big. To put things in perspective, we compare the size of EverQuest (plus its expansions) with two real-world examples.



TWEAKING YOUR SYSTEM FOR MMO

MMO games are notorious resource hogs, but you can whip your machine into shape with just a few tweaks and inexpensive hardware upgrades:

- **Having lots of system memory is crucial. Make sure your rig sports at least 1GB of RAM. Some MMO games will use as much as 2GB of RAM, if you have it; so don't skimp.**
- **Make sure you kill all the programs that might run in the background before you start your game. Defrag programs and antivirus apps can really hurt performance.**
- **Defrag your hard drive regularly. Large zone files take a long time to load, even under the best of circumstances. Don't make it take any longer.**

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MOTHERBOARDS:

A to Z

Everything you need to know about the most important component inside your PC

BY GORDON MAH UNG

Computer technology never stands still, but motherboard technology has undergone exceptionally dramatic change in recent years. Because the motherboard is the single-most important component inside your PC, having a firm understanding of its workings is vitally important whether you're buying a new rig, upgrading your existing box, or building from scratch.

Unless you've carefully archived the last three years' issues of *Maximum PC*, it's likely a number of new motherboard developments have escaped your attention: PCI Express, SATA 3Gb, SLI, and plenty more. But all this new technology doesn't necessarily mean motherboards have become more complex and/or difficult to deal with. Indeed, if you're looking to replace your musty old mobo with a brand-new one, you'll find it's easier than ever. The hard part is deciding what features are most important to you, and determining what other PC parts you'll need to fulfill a motherboard's potential: Will you need a different type of RAM, a stronger power supply, a SATA hard drive?

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Picking a CPU 38
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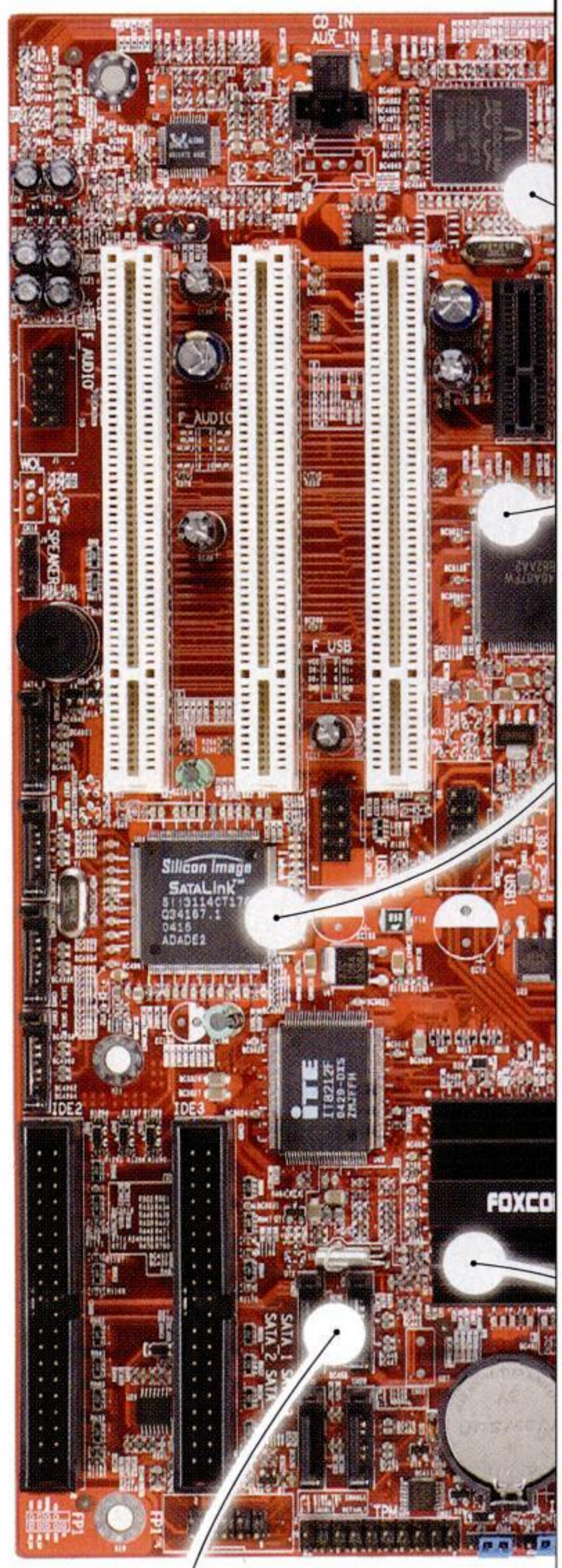
Picking the Right Chipset 39
Reviews 40
Installation Tips 46

The motherboard photo on the facing page identifies the most important components on this, the most important component inside your PC. Throughout this story, we'll delve deep into mobo technology and show you how to pick the board that's right for you.



SATA PORTS: Serial ATA (SATA) ports are used to connect hard drives to your PC. Although they're rapidly eclipsing the older parallel ATA (PATA) port, you'll continue to see both types on mobos for the foreseeable future.

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OTHER COMPONENTS: Motherboard manufacturers can add functions not built into the chipset by soldering components directly to the mobo's surface. Here we see a Silicon Image SATA RAID chip, a Texas Instruments FireWire controller, and two Broadcom Gigabit LAN chips. If you have a LAN or FireWire fetish, jot down the chip make and model to see if it's up to your standards before you buy the board.

EXPANSION SLOTS: New boards support a mix of PCI and PCI Express expansion slots. Drop a new circuit board into one of these and you can add new functionality (better graphics and sound, for instance) to your machine. The long black slot is a x16 PCI Express slot (for a graphics card); the small ones are x1 PCI-E slots. The white slots to the left accommodate legacy PCI cards.

NORTH BRIDGE: Underneath this fan is the north bridge chip, which acts as an interface between the graphics card and the CPU, and between RAM and the CPU. It also communicates with the south bridge. The north bridge can also feature additional high-speed ports for LAN, and even extra PCI Express ports. Packed with more transistors than early CPUs, these chips will overheat if not cooled. If your motherboard is slow, it's usually because the north bridge is a slacker.

CPU SOCKET: This socket determines which CPUs your board can accommodate. Pay close attention to the presence of capacitors near the processor. If you have your eye on a monstrous heatsink to facilitate overclocking, the part might not fit if the capacitors on the mobo are placed too close to the socket. In that case, your friend watching you build your system will probably snort, "Dude, you got cap blocked!"

MEMORY SLOTS: These slots harbor your computer's RAM, and their shape hasn't changed much since they were introduced many years ago. More important than the number of slots available is how the core-logic chipset (or the CPU, in the case of the Athlon 64) supports it: Single or dual channel? DDR or DDR2?

BIOS: When you turn on your PC, the motherboard boots and runs code contained in the basic input output system (BIOS). The BIOS runs tests, preps the hardware, and then hands off control to the operating system. The BIOS is stored in a small amount of flash RAM—typically 2MB to 4MB. It must be updated to support such things as RAM timing and new processor features (e.g., Hyper-Threading or multiple cores).

SOUTH BRIDGE: Underneath this heatsink lies the south bridge chip, which controls optical and hard drives, USB ports, and PCI and PCI Express expansion slots. It usually plays second fiddle to the north bridge, but with increasing emphasis on hard drive, USB, and expansion-card performance, the south bridge is garnering more and more attention. Just a year ago, these chips didn't require cooling, but now they move so much data that they demand a heatsink.

Foxconn's 925XE7AA is a sweet motherboard that runs Intel's top-of-the-line 925XE chipset.

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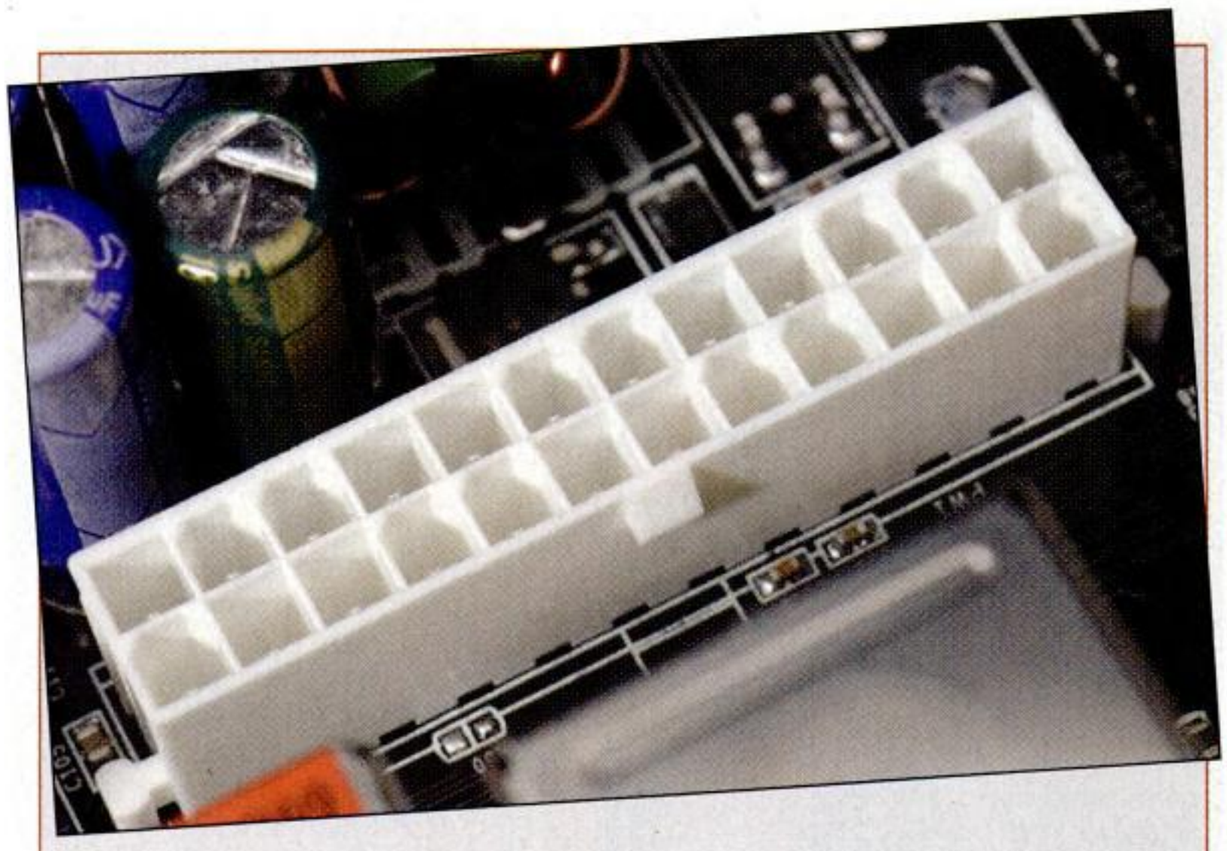
Meet the Latest Motherboard Technologies

Should your next motherboard be BTX and support both SLI and DDR2? Don't be embarrassed if you don't know the answer—our CliffsNotes primer on top-end mobo technology will have you spouting geek-speak in less time than it takes to burn a DVD.



ATX 12V 2.0

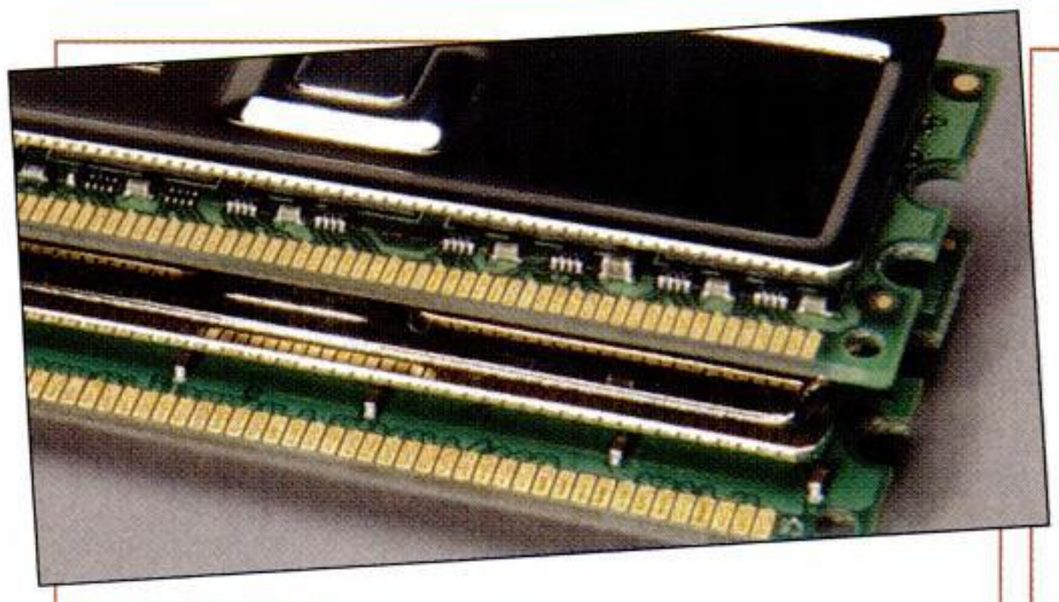
PCI Express graphics cards can suck up to 75 watts of power, compared with AGP's 50-watt maximum. ATX 12v 2.01-compliant power supplies feature a 24-pin connector that jacks into new PCI Express-capable motherboards. The good news is that you don't necessarily have to buy a new PSU to run your new 24-pin mobo. Many motherboards with a 24-pin connector are keyed to accept an older 20-pin PSU; the extra four pins are simply left vacant. To make up for the lack of power, some new motherboards allow you to supplement the mobo's main power by plugging in a second, four-pin connector.

DUAL-CORE CPU SUPPORT

For non-gaming applications, it's hard to dispute the computing performance you get from two processor cores housed in a single CPU. Even if the apps don't support it, you'll still get a "smoother" experience with dual cores. AMD says all Socket 939 motherboards that can run an FX-55 CPU will be ready to take dual-core procs. Yee haw! Things are a little more confusing on the Intel side. Intel's official word is that only its new 945/955X chipsets will work with dual cores, but mobo vendors we've spoken with say the technology seems to work just fine with 925X boards, too. Hmmm. If you're shopping for a new mobo, make sure it supports dual core.

BTX FORMFACTOR

The BTX motherboard formfactor moves the processor to the front of the case, relocates the chipset to deliver higher I/O speed, and provides better component cooling. Despite these advantages, BTX has been greeted with about as much enthusiasm as turd casserole at a pot-luck. Much of the resistance springs from chassis manufacturers, who are reluctant to spend $50K to retool their assembly lines. AMD, meanwhile, has publicly stated it won't embrace the standard unless customers demand it. We think BTX is enough of a design improvement that it will eventually become the new standard, but you can safely stick with the older ATX formfactor for the next 24 to 36 months.



DDR2 RAM

DDR2's adoption rate has been a slow burn: not as fast as its cheerleaders predicted, but not as bad as its naysayers have, umm, nayed. DDR2 improves on DDR by prefetching twice as much data as DDR, and it's designed to more than double the bandwidth of DDR400. DDR2 modules, of course, are neither physically nor electrically compatible with DDR slots: DDR2 operates at 1.8 volts, versus DDR's 2.5 volts, and has 240 pins compared with DDR's 184 pins.

Both flavors of DDR2 memory—400- and 533MHz—have been slightly disappointing thanks to increased latency. But with DDR2/667 here and DDR2/800 on the horizon, that criticism should subside. We'll remind you that many people also pooh-poohed SDRAM, RDRAM, and DDR when they were new, so we have to ask: Why you gotta player hate?

PCI EXPRESS

PCI Express has become a de facto motherboard standard seemingly overnight, despite the fact it hasn't demonstrated much of a performance boost over the older AGP standard (at least not in single-card configurations). PCI-E joins the trend of moving away from wide, slow interfaces with lots of pins to narrow, high-speed interfaces. It increases the available bandwidth for graphics from AGP's 2GB/s to a whopping 8GB/s. But PCI-E's real graphics promise lies in its upstream bandwidth throughput: 4GB/s compared with AGP's 133MB/s.

For add-in cards, the standard x1 PCI-E connectors offer about 300MB/s second of throughput—just about double that of a standard PCI slot. Considering the amount of integration on today's motherboards, however, few components really *need* to be added. For this reason, we've not yet seen any real application for x1 cards; but that's likely to change as soon as software developers create applications that take advantage of PCI-E.

NCQ AND SATA 3Gb

SATA 3Gb is a pretty simple concept: Take SATA's maximum transfer rate of 150MB/s, double it to 300MB/s, and you get SATA 3Gb. Today's hard drives don't need the throughput, but there's no reason not to have it on a new motherboard. Native command queuing is probably more important. NCQ enables a hard drive and its controller to intelligently reorder data requests, so the combo can scoop up and write data faster. Although we've seen only small performance boosts from NCQ so far, it's a good idea to have it on whatever motherboard you choose.

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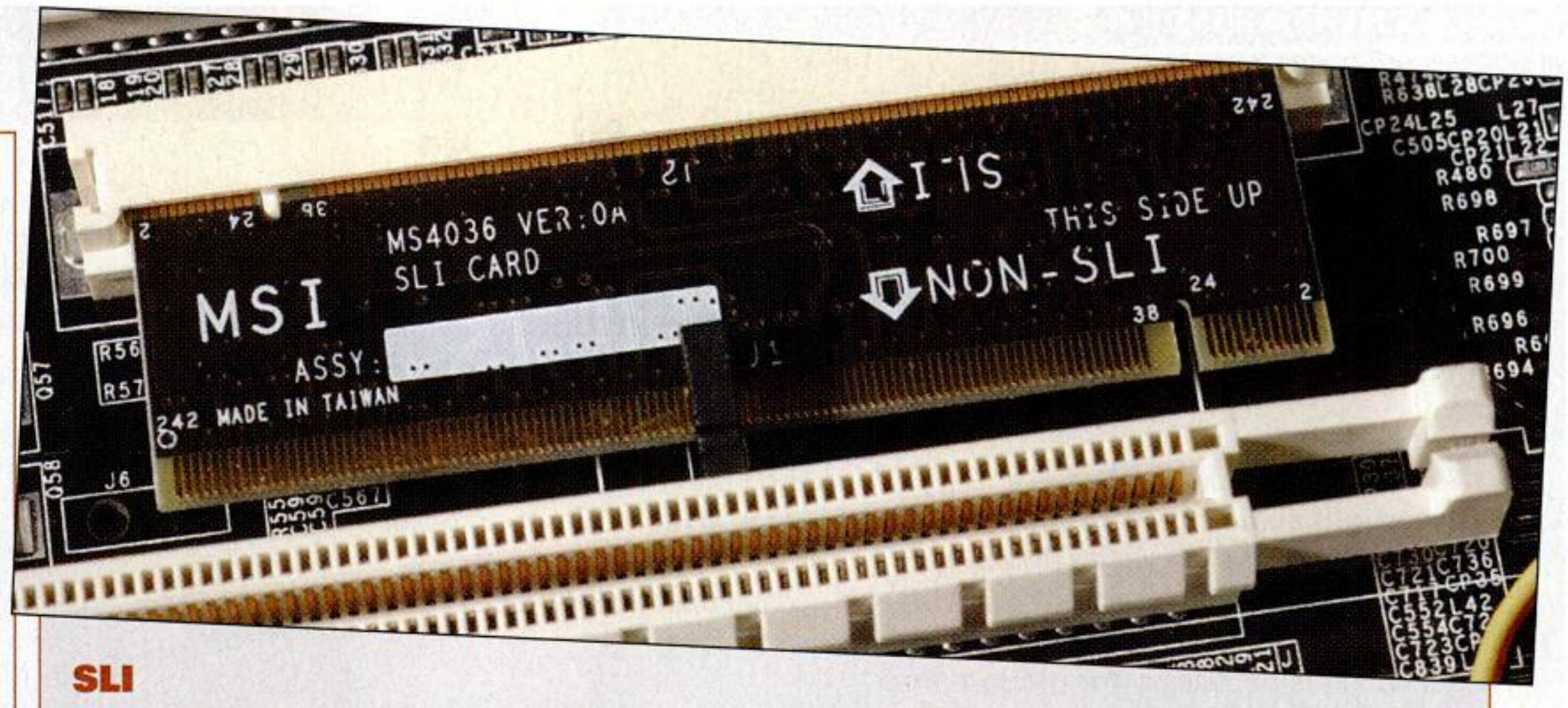
HIGH-DEFINITION AUDIO

High-Definition Audio bumps maximum audio resolution from AC-97's 20 bits up to 32 bits, while sampling rates are boosted from AC-97's 48kHz max up to 192kHz. HD Audio supports up to eight analog channels, where AC-97 supported only six. PCs outfitted with HD Audio will also support a host of Dolby technologies, including Dolby Headphone, Dolby Virtual Speaker, Dolby Digital Live, and Dolby Pro Logic IIx. Dolby Pro Logic IIx might be the most interesting. This technology can encode a stereo or 5.1-channel audio stream—including game audio—into 6.1 or even 7.1 channels in real time.

So what's the catch? Most audio experts we've talked to contend that it will be all but impossible for HD Audio to match the fidelity of even a three-year-old PCI soundcard because of all the electrical noise motherboards generate.



SLI

If one is good, two must be better, right? nVidia's propeller heads set out to answer that question when they began researching the scalable link interface (SLI). SLI allows two videocards to process graphics in tandem, via a special card connector, and display the results on a single monitor. It requires a motherboard that supports two physical x16 PCI Express slots, but that doesn't mean you'll get x16 bandwidth from each. Current consumer chipsets top out at a combined bandwidth of x20. Interestingly, nVidia says SLI technology performs best with both slots configured for x8, as opposed to running one at x16 and the second at x4.

On current SLI motherboards, you must flip a special card or throw a set of jumpers to configure the motherboard for either SLI mode or non-SLI mode. (Turn to In the Lab on page 66 for more information on SLI configuration modes.) Both the SLI configuration card and the connector that fits into SLI-capable graphics cards should be included with the motherboard. As with all good things, there's a catch: SLI won't deliver an instant performance boost with every game, but all future games are likely to run faster with the technology.

SLI has been a surprising success, but there are some grumblings of discontent within the industry. ATI, VIA, and Intel don't seem too happy with nVidia's lock on SLI, and they could very well attempt an end-run with technology of their own. We'll know more in the coming months. For now, SLI is a must-have if graphics performance is your primary concern.

Buying the Right Motherboard, in Six Easy Steps

Making the right choice doesn't have to be difficult. In fact, we've distilled the process into six easy steps.

1 CHOOSE YOUR CPU Before you buy a motherboard, you must first decide if you're going to recycle your old CPU or upgrade to something new. If you're keeping your old proc, make sure it will work with your new mobo. If you're going new, will it be AMD's Athlon 64 FX uber chip, Intel's 3.7 3GHz Pentium 4 Extreme Edition with a phat 2MB of cache, or something in between? Haven't kept up with the latest developments in CPU technology? Flip to page 38 for a quick primer on the subject.

2 PICK YOUR CHIPSET Choosing a core-logic chipset is equally as important as your CPU choice. If you need help with this choice, we rate and compare the top chipsets on page 39.

3 COMPILE A "GOTTA HAVE IT" LIST Now it's time to decide which features you want on your mobo. In the old days (well, if you consider 1999 the old days), motherboards were about as stripped as a Chevy Impala left parked on a Bronx side street. These days, motherboards come with everything you need, save a videocard, CPU, and RAM. What are you looking for? Dual Gigabit Ethernet? HD Audio? Enough SATA ports to feed a rack of hard drives? Make your list.

4 READ THE FRACKIN' MANUAL! Once you find a motherboard that tickles your fancy, read the owner's manual *before* you plop down your dough. Most motherboard vendors offer their manuals as free downloadable PDFs on their websites. The manual will reveal any of the board's limitations (such as the types of memory and CPUs it supports), and it will let you know if a PSU upgrade is necessary.

5 LOOK FOR OTHER OPINIONS If the motherboard has been out for a few months, visit the forums on the manufacturer's website and see what buyers are saying. But remember to keep everything in perspective: People don't go to the forums to wax poetic about their Socket 939 board, they go there to bitch. It's all but impossible to determine if the person complaining is a fried customer or one of the manufacturer's competitors looking to sow fear, uncertainty, and doubt. Always take forum comments with a grain of salt, but if you see a pattern emerging, it could be a warning sign.

6 BUY THE LATEST REV It's not at all uncommon for motherboard manufacturers to revise their designs without going so far as to introduce an entirely new model. Newer revisions are almost always better than older boards, so try to purchase the latest version of the motherboard that's available. You'll find the rev numbers silk-screened on the board.

How to Pick a CPU

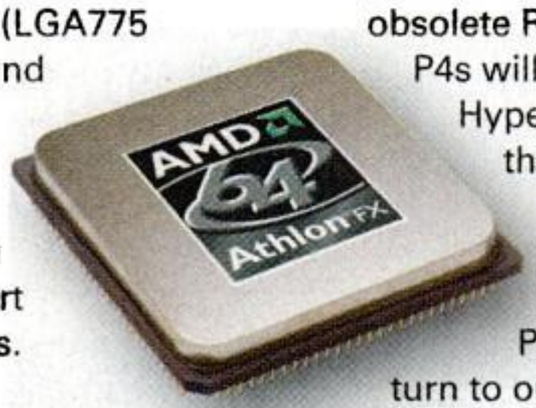
Your motherboard journey really starts with the CPU, and today's offerings from Intel and AMD are about as different as they can be. Intel's CPUs feature long instruction pipelines designed to scale to super-high clock speeds. AMD's chips are designed with shorter pipelines that are more efficient, but that can't scale as high.

INTEL PENTIUM 4 FAMILY

They might all be called Pentium 4, but these siblings can be vastly different. There are four basic types of P4 CPUs using Intel's LGA775 processor package, which is necessary for modern Intel motherboards:

➔First-generation Prescott P4s feature 1MB of L2 cache and run as fast as 3.8GHz. They're fast, but they take a back seat to AMD's Athlon 64 FX in many applications and games, and they don't support 64-bit operating systems or application software.

➔The P4 Extreme Edition (LGA775 version) runs at 3.46GHz and features 512K of L2 cache augmented by 2MB of L3 cache. It runs on the 1066MHz front-side bus, but it does not support 64-bit OSes or applications.



➔In March, Intel unveiled the 6XX-series of Pentium 4 CPUs, each of which is equipped with 2MB of L2 cache, operates on an 800MHz front-side bus, and supports 64-bit OSes and apps. The top chip in this series, the P4 660, runs at 3.6GHz.

➔Intel also introduced a new P4 Extreme Edition in March. This chip runs at 3.7 3GHz, operates on the 1066MHz front-side bus, and supports 64-bit OSes and apps.

Intel's newest processors may help the company get back on track. They might be slower than the Athlon 64 FX in gaming, but not by much, and the P4s outscore the Athlon 64 FX in a number of desktop applications and video apps.

If you go with a P4 CPU, we heartily recommend buying one of the 64-bit capable chips, because all the rest will be obsolete RSN. Going with one of these P4s will also deliver the benefit of Hyper-Threading, a technology that turns a single CPU core into two virtual cores. If you want the scoop on the new dual-core Pentium D and Pentium Extreme Edition CPUs, turn to our news story on page 12.

AMD ATHLON 64 FAMILY

AMD has three offerings for performance-minded folks: Two versions of the Athlon 64 and the FX series. For the most part, each core features the same basic technology, but certain features are turned off on the lower-priced CPUs. Athlon 64 CPUs are fastest in applications that use lots of floating-point math and those that need tons of bandwidth, which AMD's CPUs can supply thanks to their on-die memory controller.

➔The Athlon 64 comes in a single-channel RAM version that fits Socket 754 motherboards, and a dual-channel RAM version that fits Socket 939 boards. The 754 procs are good performers, but with dual-core coming only to Socket 939, we think it makes sense to pay the premium for the upgrade opportunities. Athlon 64s have either 512K or 1MB of L2 cache, depending on the model. Clock speeds top out at 2.4GHz.

➔Right now, the Athlon 64 FX-55 is the fastest gun in town for gaming, and it's pretty damned good in applications, too. It features a clock speed of 2.6GHz and provides 1MB of L2 cache.

As the names imply, all Athlon 64 and Athlon 64 FX processors support 64-bit operating systems and applications, and have done so since their introduction. AMD plans to introduce dual-core Athlon 64 CPUs in the second half of 2005; interestingly enough, the company tells us its high-end Athlon 64 FX processors will remain single-core.

Core-Logic Chipsets

When you shop for a new motherboard, one of the most important decisions you'll make is which core-logic chipset to select. If you think of your motherboard as a city, the core-logic chipset is the board's local government: It controls the flow of information between the hard drives and the computer, it tells the USB ports what to do, and it's critical in determining how fast the system can access memory.

Today's motherboards use one of two scenarios: Mobos designed for Intel's Pentium 4, including the new dual-core CPUs, go the traditional route of embedding a memory controller in the chipset's north bridge. Memory-controller design is where chipset engineers get to strut their stuff. As we see DDR2 speeds hit 667- and then 800MHz, you'll see who's best.

Motherboards designed to support AMD's Athlon 64 and Athlon 64 FX take a different approach. AMD took a bold tack by moving the memory controller from the chipset to the CPU. This allows the controller to run at the same speed as the core—which is a couple of gigahertz faster. This on-die memory controller is responsible for much of the Athlon 64's performance advantage.

It's not a complete win-win though: What AMD gained in performance, it gave up in flexibility. You can buy a Pentium 4 and drop it into an old DDR400 motherboard today. In 12 months, you could migrate that chip to a board that supports DDR2/800 or higher. In 24 months, that CPU could potentially be used in a motherboard supporting DDR3. You can't do that with the Athlon 64 or 64 FX because the controller is tied to the memory technology.

Even though all the headlines go to the memory controller, the chipset's less glamorous functions are probably even more important. USB performance, hard drive performance, and how fast the PCI cards can transfer data are all affected by the core-logic chipset.

THE LATEST CHIPSET DEVELOPMENTS

INTEL: If everything goes according to Intel's plans, the company will be shipping its 955X chipset, which supports DDR2/667, as you read this. Performance-wise, DDR2/667 should finally pull away from DDR400. More importantly, 955X (and 948 boards) will feature support for dual-core processors.

There's only one thing Intel hasn't done for its processors: license SLI from nVidia. Conveniently enough, however, nVidia now has a license to build its own Pentium chipsets.

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NVIDIA: nVidia plans to take its popular nForce4 chipset for the Athlon 64 FX and make it work with the Pentium 4. It's not quite that simple, but it pretty much describes the nForce4 SLI Intel Edition. nVidia actually dusted off some designs from the award-winning nForce2 chipset and brought them to the Intel side. The chipset includes a hardware firewall and SATA 3Gb, too. Unfortunately, nVidia hasn't said whether it can run dual-core procs, so we're in limbo on that score. The company also won't disclose the interconnect speed between the north and south bridges, so you can expect some competitive specsmanship in the coming months.

VIA: VIA lost some ground to nVidia concerning AMD chipsets, but its P4 offerings are appealing. The new PT894 Pro can run PCI Express *and* AGP graphics cards simultaneously for dual-monitor support. VIA is also betting that consumers will want to run DDR now and upgrade to DDR2 later, so it supports both types of RAM. You can't run both types simultaneously, of course, so you'll have to throw out your DDR RAM if you want to upgrade. And like Intel, the company can't support SLI at the moment.

How to Pick a Chipset

Judging a core-logic chipset can be a tricky proposition, but here are a few tips to help you separate the wheat from the chafe.

➔Don't get caught up in fancy names. For the most part, the dollar words are there to sex-up something that would otherwise sound pretty boring. Dig beneath the market-speak to get at the cold, hard specs.

➔Interconnect speeds between the north and south bridges used to be 133MB/s, but now they've reached speeds as high as 2GB/s. What's the minimum you should expect? That's a complicated question, but 800MB/s to 1GB/s seems to be the standard. You also need to consider how the chipset is configured: If there are four x1 PCI Express lanes in the south bridge, you'll need a 1- to 2GB/s connection to support the potential bandwidth. If the x1 lanes are hooked directly to the north bridge, the interconnect speed isn't as critical.

➔Check your six. In some chipsets, the mobo manufacturer can swap the south bridge for a different chip that might have more or fewer features. Make sure you know what you're buying.

➔A good portion of a chipset's magic lies in its memory controller. Chipset and mobo makers rarely disclose performance numbers, so you'll have to rely on the media for evaluations of chipset speeds. Remember that the motherboard's design can also affect memory performance, so read multiple reviews of the same chipset.

MAKE/ MODEL	CPU SUPPORT	BUS SPEED	PCI EXPRESS SUPPORT	RAM SUPPORT	ATA SUPPORT	INTERCONNECT SPEED	EXTRAS	OUR TAKE
Intel 925X	Pentium 4, Celeron	800, 1066	20 lanes: 16 for graphics, 4 in the south bridge	Dual Channel DDR2/400-DDR2/533	4 SATA, 1 PATA	2GB/s	HD Audio, Matrix RAID	Intel's 925X was a bold step forward. It was the first chipset to offer support for PCI Express, DDR2, and HD Audio. The absence of dual-core support, however, renders this a poor choice for a new board.
Intel 945	Pentium 4, Celeron, Pentium D, Pentium Extreme Edition	800, 1066	22 lanes: 16 for graphics, 6 in the north bridge	Dual Channel DDR2/400-DDR2/667	4 SATA, 1 PATA	2GB/s	HD Audio, Matrix RAID	The 945 is similar to the faster 955, but it can only address 4GB of RAM, loses support for ECC, and doesn't have the memory optimizations of its big brother.
Intel 955X	Pentium 4, Celeron, Pentium D, Pentium Extreme Edition	800, 1066	22 lanes: 16 for graphics, 6 in the north bridge	Dual Channel DDR2/400-DDR2/667	4 SATA, 1 PATA	2GB/s	HD Audio, Matrix RAID	This chipset is the launch partner for Intel's dual-core CPUs. It has everything except for licensed support for SLI.
VIA PT894 Pro	Pentium 4, Celeron	400, 533, 800, 1066	22 lanes: 16 for graphics, 4 in the north bridge, 2 in the south bridge	Dual Channel DDR266-400 and DDR2/400-DDR2/667	4 SATA 3Gb, 2 PATA with VT8251 south bridge	1066MB/s	DualGFX support for two PCI Express videocards	It's not clear if DualGFX will support nVidia's SLI mode.
VIA PT880 Pro	Pentium 4, Celeron	400, 533, 800, 1066	Six lanes: 4 for PCI Express, 2 in the south bridge	Dual Channel DDR266-DDR400 and DDR2/400-DDR2/533	4 SATA 3Gb, 2PATA with VT8251 south bridge	1066MB/s	Can run PCI Express graphics and AGP simultaneously	Offers only x4 PCI Express graphics.
nVidia nForce4 SLI, Intel Edition	Pentium 4, Celeron (possibly Pentium D and Pentium Extreme Edition)	800, 1066	20 lanes: 16 for graphics, 4 in north bridge	Dual Channel DDR2/400-DDR2/667	4 SATA 3Gb	Not disclosed	The only Intel chipset to support SLI, hardware firewall and SATA 3Gbb	nVidia's SLI chipset is a no-brainer for gamers, but the lack of official support for dual-core CPUs leaves us a little worried.
nVidia nForce4 SLI	Sempron, Athlon 64, Athlon 64 FX	N/A *	20 lanes: 16 for graphics, plus 4	Dual Channel DDR266–DDR400	4 SATA 3Gb	N/A to single-chip design	SLI, hardware firewall, SATA 3Gb, RAID	We've been very happy with the nForce4, and so is nVidia: The company has already shipped 1 million of these chipsets.
VIA K8T890 Pro	Sempron, Athlon 64, Athlon 64 FX	N/A *	22 lanes: 16 for graphics, 4 in the north bridge, 2 in the south bridge	Dual Channel DDR266-DDR400	4 SATA 3Gb, 2 PATA with VT8251 south bridge	1GB/s	VIA Envy24 audio chip, RAID	Despite the K8T890 Pro chipset's debut, boards using the chipset have been difficult to find.
SiS 756	Sempron, Athlon 64, Athlon 64 FX	N/A *	18 lanes: 16 for graphics, 2 in south bridge	Dual Channel DDR266-DDR400	4 SATA, 2 PATA	1GB/s	RAID	SiS was once the main purveyor of single-chip core logic, but the company went back to a two-chip design for the SiS 756.

* The memory controller is built into AMD's Sempron, Athlon 64, and Athlon 64 FX processors.

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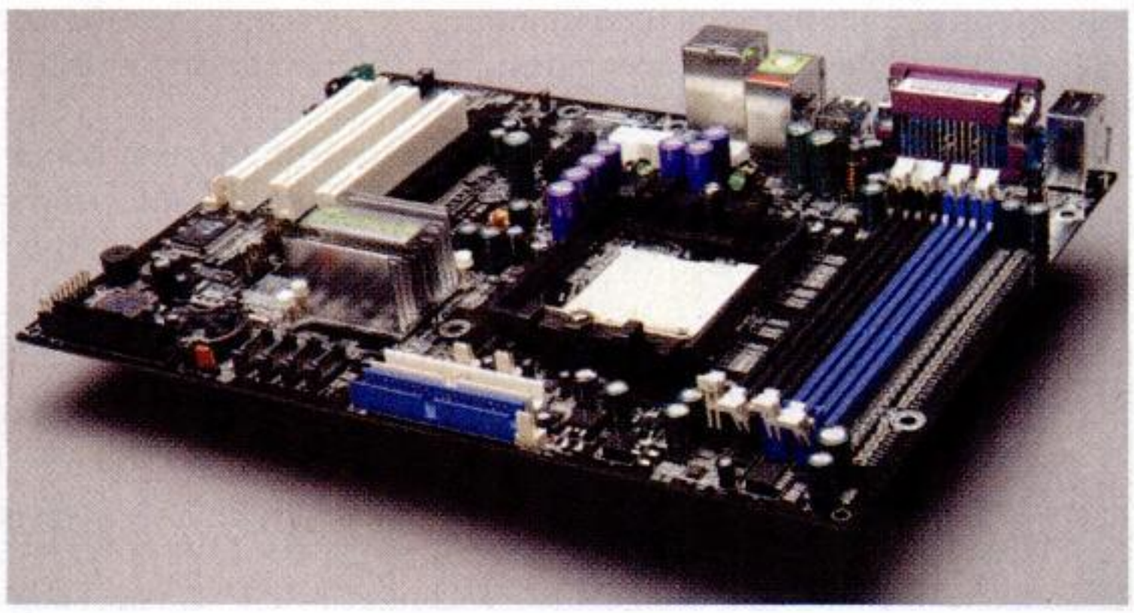
nForce4 Motherboard Reviews

CHAINTECH VNF4 ULTRA ZENITH VE



When you're looking at a budget motherboard, it's hard to get your groove up over anything other than the price tag. That's the problem we had when we unwrapped Chaintech's VNF4 Ultra Zenith Value Edition board: On the one hand, it's easy to yawn at the VNF4 Ultra's build-out and be done with it; on the other hand, you do get a helluva lot of features for the money.

nVidia's hot nForce4 chipset is at the heart of the VNF4 Ultra. As you might have guessed from its name, this motherbaord uses the Ultra version of the chipset, which is *almost* on par with the SLI version of the chipset (with the notable exception of SLI support). You get SATA 3Gb, a hardware firewall with Active Armor, RAID support, Gigabit Ethernet, and multichannel onboard audio.

So why are we so ho-hum about this board? It's missing a few important features: The VNF4 Ultra, for example, is the only board here that doesn't include a FireWire port. This is also the one board that offers only passive chipset cooling; while that might help reduce noise and improve reliability (fans do fail), we noticed that the single-chip nForce4 heated the chipset to pretty high levels—especially with a GeForce 6800 Ultra sitting next to it. If you choose this board, we recommend installing it in a case that's well ventilated.

Out of the box, the VNF4 Ultra was about 10 percent slower than its direct rival, the Foxconn WinFast that's also reviewed here; but after we updated the Chaintech board's BIOS, its performance improved to where it should be. When all is said and done, there is very little difference in performance between these two Ultra boards, including the fact that neither has an onboard LED to indicate that the system is plugged in. Why cheap out over a 2-cent part?

Given the boards' performance similarities, it really comes down to features and configuration, and on that score, Foxconn has the edge: It comes with far better documentation and you get FireWire and more PCI slots.

VERDICT 7

⊖ Lots of fan headers and a low, low price.
⊕ Lacks extra features and a power LED.

$100 STREET, WWW.CHAINTECHUSA.COM

FOXCONN WINFAST NF4U8KAA

Think it's nuts to spend the equivalent of two car payments on a couple videocards, just so you can run SLI? Foxconn has you pegged as the penny pincher you are, buddy. Extra SATA ports? *Feh.* Onboard wireless or dual NICS? Who needs *that* crap? Just gimme the basics.

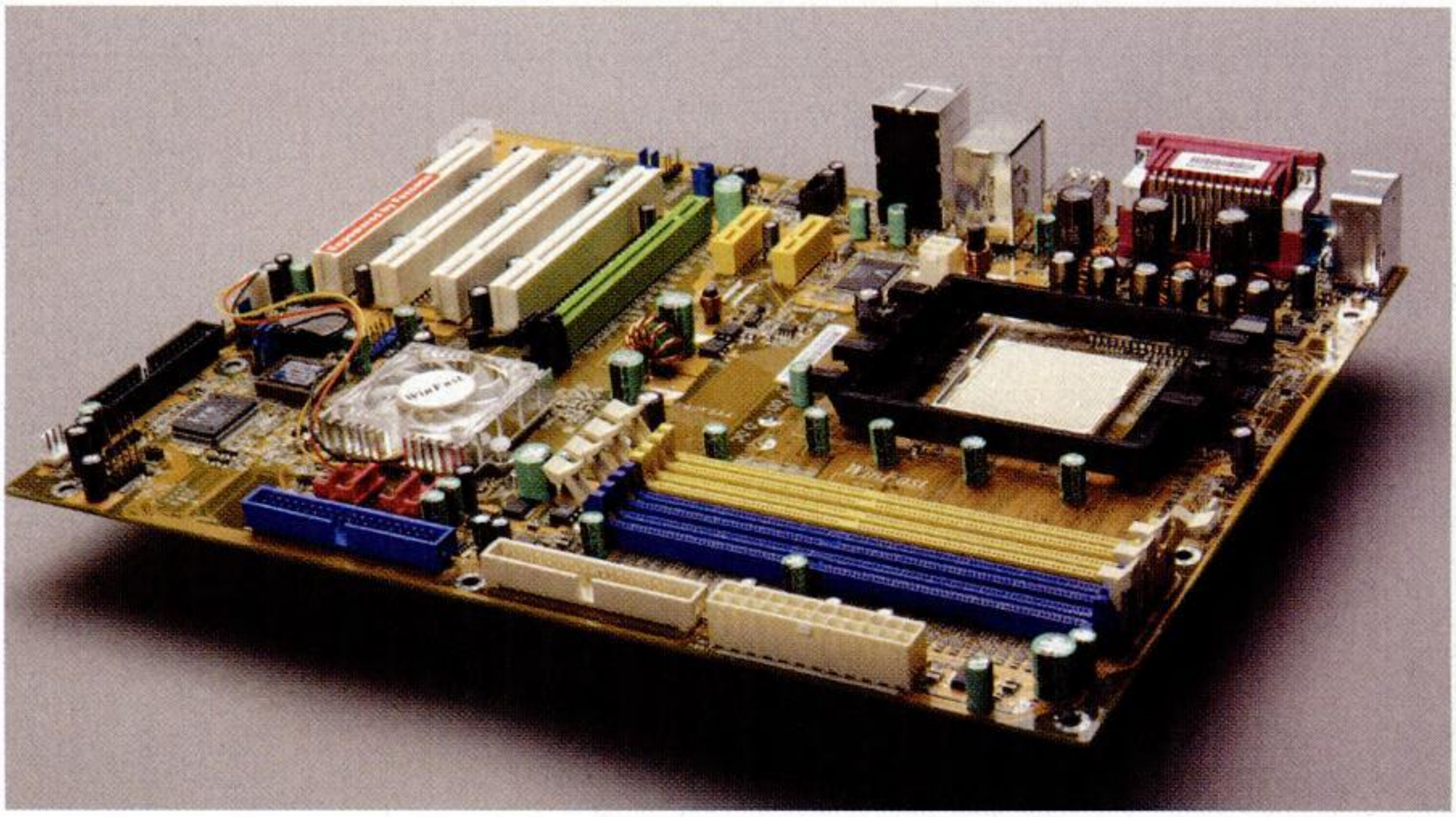
Foxconn has tailored its WinFast NF4U8KAA board for people like you. Its straightforward feature set makes it the Toyota Tercel of mobos: Forget the power seats, leather upholstery, or HID lights; those are for wussies. But that's not to say the Foxconn board is a complete strippo. It uses the Ultra chipset, so you do get SATA 3Gb, RAID, and nVidia's Active Armor, which ups the amount of firewall features.

Foxconn also continues to offer the best combination of expansion slots we've seen in mobos: You get four PCI slots, versus three on the Chaintech. The Foxconn also aces the Chaintech by including a FireWire port and providing far superior—albeit sometimes odd—documentation: The manual warns you, for example, to run only certified PCI-E graphics cards, and it lists just four that qualify. We commonly see this kind of limited recommendation for memory, which can be finicky, but to certify only four videocards strikes us as arbitrary. Foxconn's front-panel connector labeling is also a tad confusing, but suvivable. The BIOS is feature-packed, and we found that Super Boot mode can cut down boot times by about 25 percent.

VERDICT 8

⊖ Generous PCI slots.
⊕ Lacks power-on LED.

$120, WWW.FOXCONNCHANNEL.COM



In our benchmark tests, the Foxconn was just a tad faster than the Chaintech; but you could safely call it a tie. Interestingly, MSI's SLI board muscled past both these Ultra offerings even while running a single videocard.

It would be easy for Foxconn to say, "Well, what do you want for $120?" But we could just as easily retort, "For another $60, we could have a board with SLI capability."

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MSI K8N NEO4 PLATINUM/SLI

If you thought we were harsh for yawning at the Ultra boards' lack of features, you won't when you hear about the SLI motherboards.

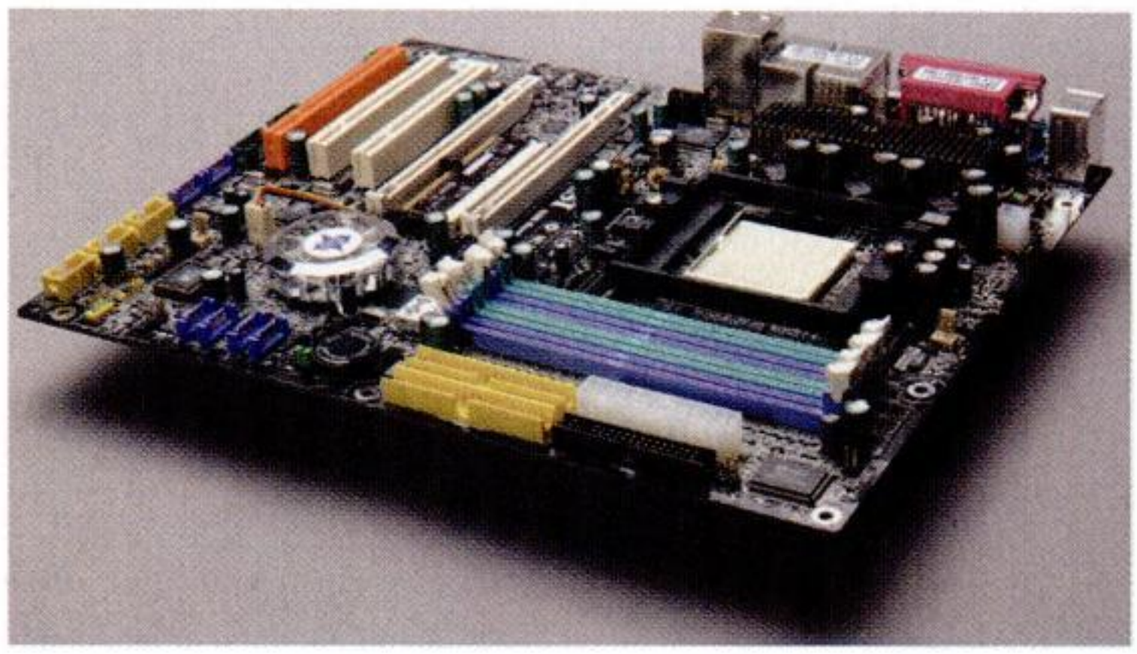
MSI's K8N Neo4 Platinum/SLI ladles on goodies that just don't come with budget boards, and it even features a couple new tricks we hadn't seen before. First up is the inclusion of a Creative Sound Blaster Live! DSP, coupled with a 24-bit Cirrus Logic codec. Unlike other motherboards, the K8N Neo4's Live! handles some audio-processing chores to lighten the CPU's load. The new 24-bit Live! supports EAX Advanced HD, but it's not clear what *level* of support it offers.

The second new feature the K8N Neo4 offers is a Silicon Image RAID controller that plumbs into PCI Express. Consumer boards typically feature RAID chips that plug into PCI, which limits throughput to 133MB/s. Even though it's only on an x1 PCI-E connection, the K8N's RAID wouldn't be bottlenecked until it hit 250MB/s. Even better, the Sil 3132 supports SATA 3Gb, as well as both NCQ and TCQ modes.

Although these features are revolutionary, MSI didn't go all the way. The board has two NICs, but instead of offering dual Gigabit, they comprise a Fast Ethernet/Gigabit combo. MSI also skimped on the PCI-E slots. Who knows if we'll have PCI-E cards (other than graphics cards, of course) this year, but if you run SLI in the K8N board, you'll have used all your PCI-E options.

Performance-wise, the K8N is just what we'd expect from an MSI board: pretty durn good. We saw a drop in performance in SLI mode when running *PC Mark 2004's* graphics bench (which we don't take too seriously), but SLI performed as expected elsewhere.

One thing we *don't* dig is the SLI configuration card. MSI uses



nVidia's reference design, but its delicate retaining arm feels just a little under-engineered (at least it wasn't as annoying as DFI's design, below).

Overall, we're pleased with the board's use of PCI-E, and the novel use of an audio DSP, but we wish MSI had gone all the way. Still, for just three more Jeffersons than you'd pay for either of the lesser Ultras we looked at, you get a whole lot more mobo.

VERDICT 9

- Live update can automatically update drivers and BIOS.
+ Why no extra PCI-E slots?

$175 STREET, WWW.MSICOMPUTER.COM

DFI LAN PARTY NF4-SLI DR

Who says motherboards are all the same? You certainly can't say that about DFI's LAN Party NF4-SLI DR, which takes a unique tack among SLI boards. The most noticeable departure are the six jumper blocks that must be plucked out to reconfigure the board for SLI mode.

We thought DFI was just trying to piss us off, at first, but this design is actually good for some applications. First, it allows you to configure the PCI-E slots in a more flexible manner (see this month's In The Lab section on page 66 for details). Second, the contact is more permanent than with the typical SLI configuration cards, which seem at risk of popping out.

DFI's engineers have also carried the audio daughtercard idea—which we first saw in Abit's Fatal1ty AA8XE motherboard (reviewed April 2005)—to its logical conclusion: Abit moved the audio jacks onto a daughtercard to eliminate electrical noise, but left the actual audio codec on the board.

VERDICT 9

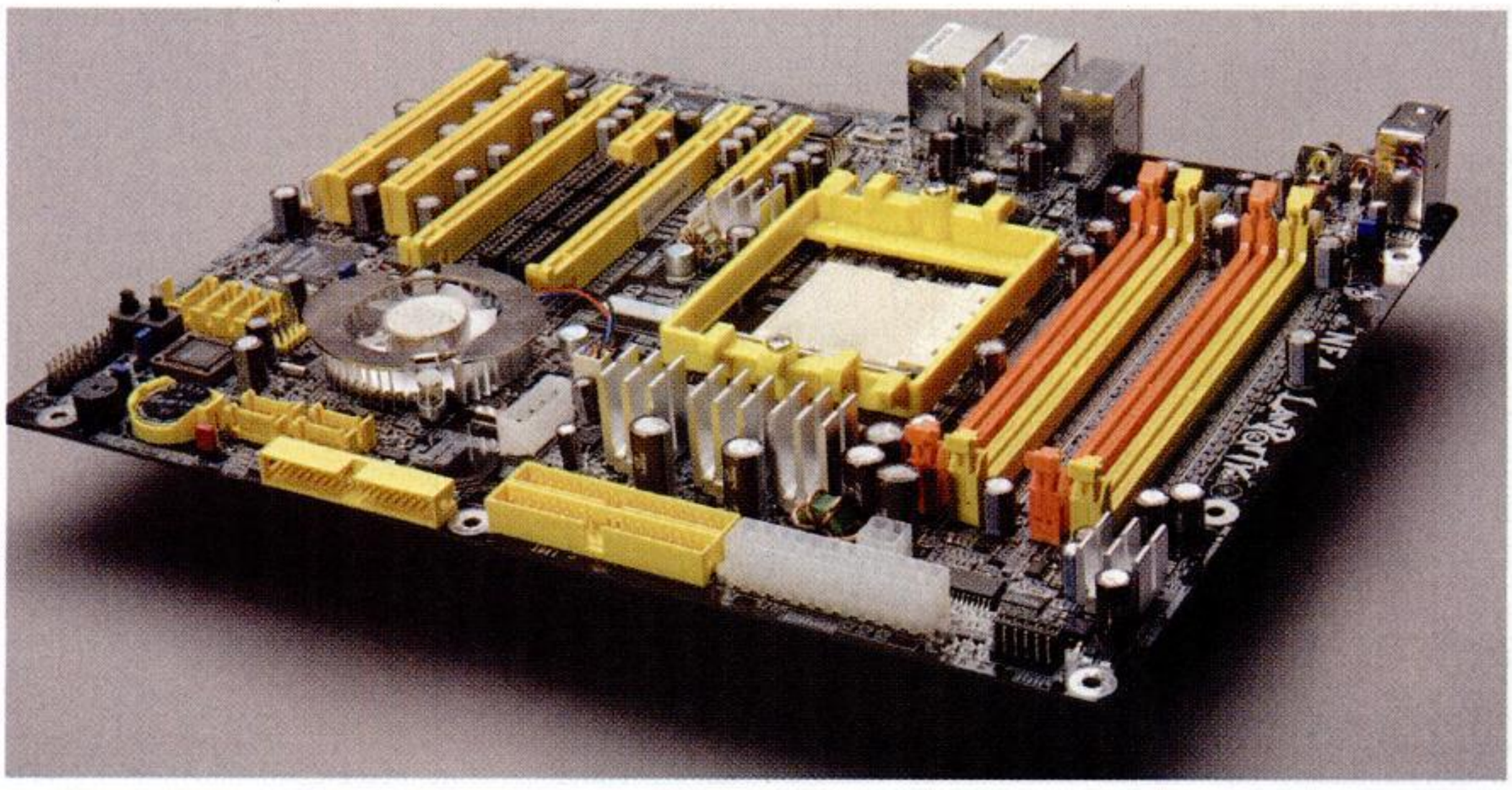
- Highly flexible PCI-E configuration
+ Annoying jumper system for SLI configuration

$220 STREET, WWW.DFIWEB.COM

DFI packages both the analog outputs *and* a Realtek codec onto the separate card. Theoretically, this design should make the onboard audio sound cleaner, and it would be even better if DFI had used 24-bit—instead of 16-bit—codecs. That design choice likely came about because the nForce4 chipset doesn't support HD Audio.

Whereas Chaintech and Foxconn skimped on LED indicators, DFI includes a healthy dose of lights, including a bank of LEDs that light up to signal where your board is "stuck" if it doesn't POST correctly. DFI also did a fair amount of BIOS tinkering, adding a feature that enables you to create profiles that can be accessed at boot. All BIOSes in this roundup offer a complete set of features, but this profile feature—coupled with just about every other possible setting we could think of—renders the DFI BIOS our favorite.

In testing, we discovered the LAN Party board to be pretty even-steven with MSI's submission. What you should really consider in deciding between the two are the features and configuration of each board.



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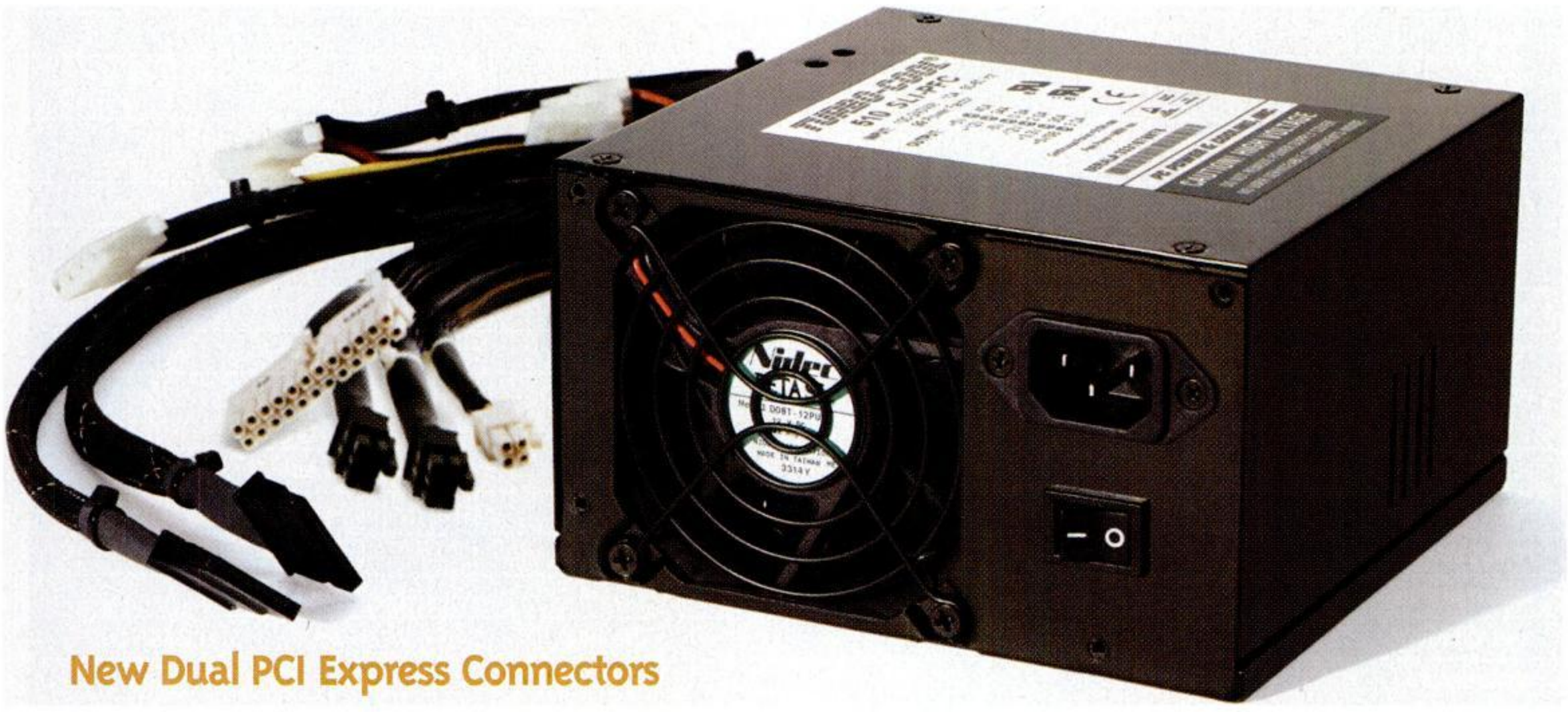
The SLI Supply!



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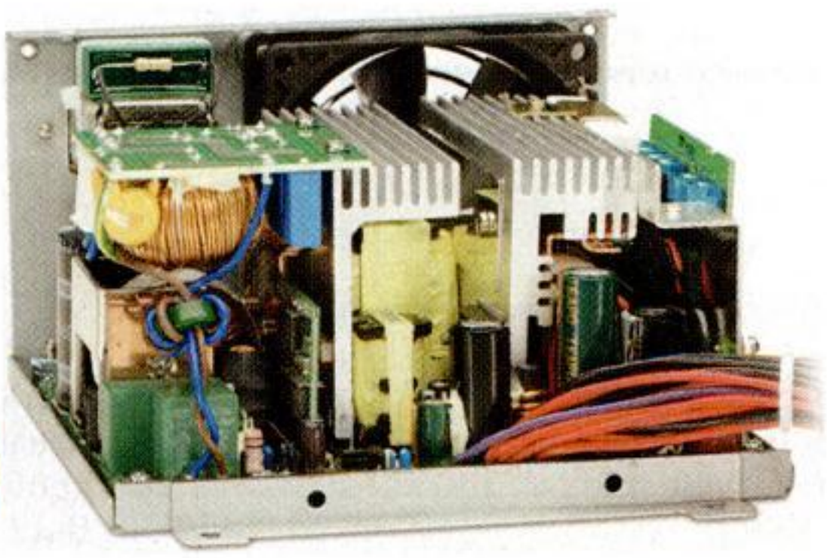

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BENCHMARKS

MAKE	FOXCONN	CHAINTECH	MSI	DFI
Model	WinFast NF4UK8AA	VNF/Ultra	K8N SLI Platinum	LAN Party NF4-SLI DR
Storage	4 SATA, 2 PATA	4 SATA, 2 PATA	6 SATA, 2 PATA	8 SATA, 2 PATA
NIC	Gigabit/ Vitesse PHY	Gigabit/ Vitesse PHY	Dual Gigabit Marvell PHY	Dual Gigabit Ethernet, Marvell/ Vitesse PHY
Expansion slots	1 x16 PCI-E, 2 x1 PCI-E, 4 PCI	1 x16 PCI-E, 2 x1 PCI-E, 3 PCI	2 x16 PCI-E, 3 PCI	2 x 16 PCI-E, 1 x1, 1x2
Audio	Realtek ALC850	Realtek ALC850	Sound Blaster Live! 24-bit	Realtek ALC850 on riser card
USB/FireWire	4 ports +2 headers USB, 1 FireWire	4 ports + 3 headers USB	4 ports +3 headers USB, 1 FireWire port + 2 headers	6 ports + 2 headers USB, 1 port + 1 header FireWire
Mode	X16	X16	SLI x8x8	SLI x8x8
PC Mark 2004 Overall	**5,299**	5,282	4,719	4,785
PC Mark 2004 CPU	4,870	**4,913**	4,837	4,889
PC Mark 2004 Memory	5,800	5,703	5,789	**5,856**
PC Mark 2004 Graphics	**7,951**	7,935	7,180	7,312
PC Mark 2004 HDD	**6,263**	6,205	6,200	6,186
3DMark2001 SE OV	26,274	26,087	29,518	**29,531**
3DMark2003 OV	13,194	13,171	**21,404**	21,392
3DMark2003 CPU	**1,192**	1,184	1,141	1,142
3DMark2005 OV	5,527	5,537	9,742	**9,758**
3DMark2005 CPU	5,441	5,205	**5,475**	5,283
Quake III	**535**	445	481	486
Doom 3	114	113.3	**124.4**	123.9
AquaMark Overall	73,841	72,744	**85,932**	85,317
AquaMark GFX	10,788	10,677	**13,545**	13,470
AquaMark CPU	11,699	11,413	**11,747**	11,631
Sandra 2005	6,049	6,025	6,066	**6,091**
HD Tach 3.0 AVG	64.1MB/s	64.2MB/s	**64.3MB/s**	63.9MB/s

Best scores are bolded.

And the winner is...

The featurific SLI boards are the obvious winners in this contest. The two Ultra boards in this roundup are practically barren of features—they seem designed to go into generic white boxes destined for a corporate environment. *Yawn.* Forced to pick between the two Ultras, however, we'd give the nod to the Foxconn, with its superior documentation, feature-rich BIOS, better mix of PCI-E and PCI slots, and built-in FireWire. The board also supports an auxiliary power connector, for people who want to run 6800GT/Ultra-class cards with their 20-pin PSUs.

The SLI category is more of a contest. You'll note that we gave both SLI boards identical scores. That's because each has moves the other lacks. The MSI K8N features 24-bit DACs and the Live! DSP. It also plumbs its RAID controller into PCI Express for improved RAID performance, and it supports SATA 3Gb and two forms of command queuing. The K8N is also one of the lowest-cost SLI boards we've seen to date, with prices in the $170 to $180 range. In the minus column, the MSI doesn't afford you any extra PCI-E slots if you're running SLI, and one of its two NICs is just Fast Ethernet.

LOOKING FOR AN INTEL MOBO?
Our advice is to wait. It just doesn't make sense to build an Intel system that doesn't support the new dual-core P4s.

The DFI, on the other hand, features an annoying, yet ultimately more useable, PCI Express configuration. This is also the first board we've seen that moves its onboard audio codec and jacks onto a module. In the minus column, the audio components are limited to 16-bit, so we're not really sure about the module's pay-off.

This board is also more expensive, but DFI includes a kit to sleeve your cables, a mesh carrying case for your PC, rounded cables, and a front bay with POST lights and SATA, optical, and USB ports.

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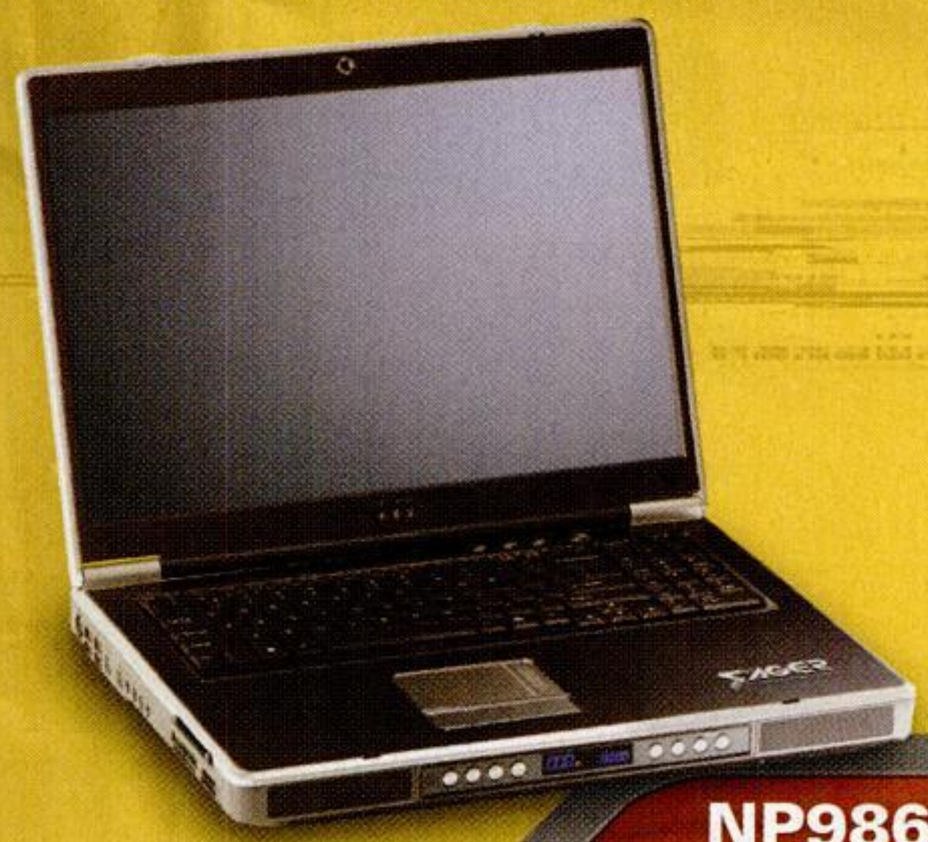
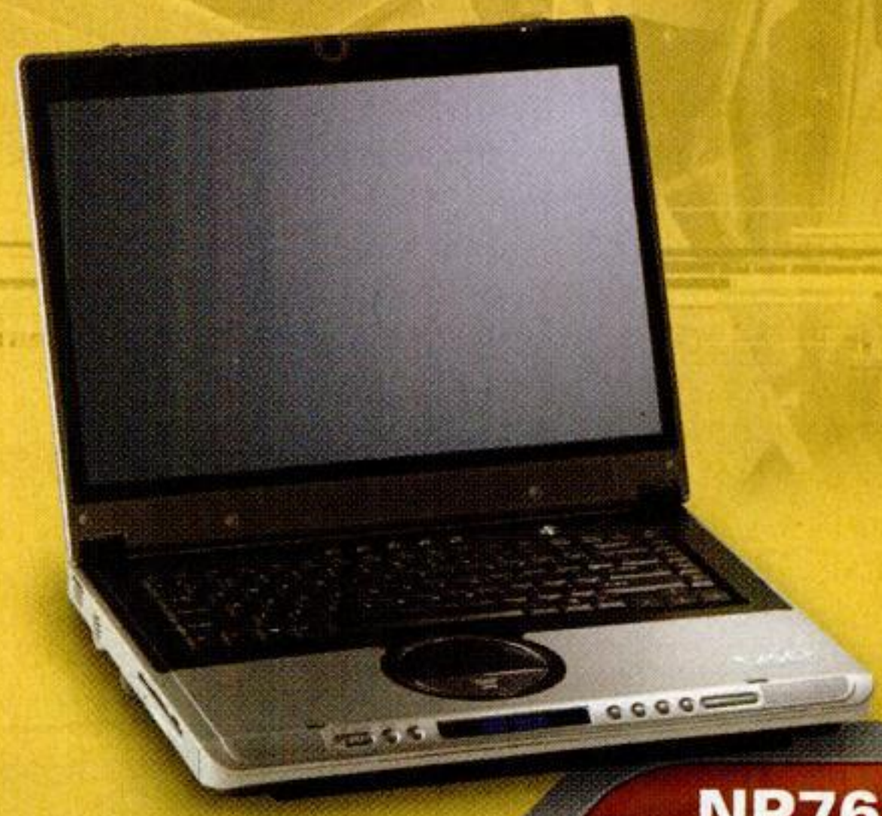


NP9860



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> TV Tuner with Remote

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> Bluetooth Module
> TV Tuner with Remote

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Motherboard Installation Tips

Installing a motherboard might look as hard as pulling the engine and tranny out of your car, but it's really about as easy as changing its oil or air filter. Here are top tips for making the process even easier.

1

AVOID COLORFUL LANGUAGE

Have you ever wondered why there's no standard layout for power and reset buttons, or hard drive and power LEDs? It's because the PC industry wants you to curse them every time you plug in the HD LED in reverse or confuse the reset and power buttons. Seriously, though, some motherboards are clearly laid out and easy to understand, while others almost seem designed to confuse. To compound the pain-in-the-neck factor, cases don't seem to follow a standard either. That's why we recommend that you grab your flashlight and crack open the manual instead of guessing, which never seems to work anyway.

CAUTION!

USB PORTS AND HEADERS: *Don't just plug your case's USB ports into your motherboard's USB headers without first making sure they match; otherwise, you could smoke both the motherboard and the USB device. Look up the pin layouts in both your case and your motherboard manuals before connecting the two.*

2

SCREW THE SCREWS

If your case uses the typical brass motherboard mounts that must be screwed into the case, make sure you apply enough torque so they don't back out when it comes time to remove the motherboard. If you don't have a small wrench that can grab onto the hex-shaped nuts, use a Leatherman or a set of needle-nose pliers to crank them down. While you're there, make sure you tighten the screws that hold the motherboard in place. We can't count the number of systems we've seen with screws that were backed out of the mounting holes, teetering on the edge of falling out and bouncing around the case interior.

3

TAKE A COUNT

An easy way to make sure you don't have an errant motherboard mount shorting out your board is to count the mounts and write the number on a piece of paper. If you have eight mounting points, but you've used only seven screws, you'll know that one mount is missing a screw.

4

PUT YOUR SHIELDS UP

Before you drop in your motherboard, and even before you install the motherboard mounts, remember to pop in the I/O shield (which is a fancy name for the metal plate with holes that accommodates your USB, PS/2, and parallel ports). Failure to do this will mean removing the entire motherboard from the case just to install the shield, or leaving a dust-sucking hole in the back of your PC.

CAUTION!

LGA775 PRECAUTIONS: *Intel's new-fangled LGA775 connector does wonders for a CPU's ability to hit higher speeds, but it can be scary to install. Respect the LGA775 formfactor: Bend a pin on the motherboard and it's* ***adios, muchacho****. To properly install the proc, use two fingers to hold the CPU parallel to the socket. Once you have the notches lined up with the socket, lower it in directly. Tilting the proc in or sliding it around in the socket could kill your motherboard.*

5

CHOOSE THE RIGHT PORT

Don't assume that plugging a SATA or PATA drive into any connector will allow your system to boot. Many motherboards integrate RAID and ATA controllers to run the additional SATA/PATA ports. Those RAID and ATA controllers will require extra drivers and a floppy drive to get *Windows XP* up and running. If you're looking to boot off a single hard drive without having to install extra drivers, look for the ports plumbed directly into the south bridge. As you might guess, these ports are usually closest to the south bridge; ports on additional RAID chips are usually closest to those chips.

CAUTION!

RAM ARMS: *Motherboards are now packed so tightly that there's little clearance between the RAM modules and videocards. Make sure you don't leave the holding arm for the RAM modules extended; if you do, you're likely to either break the arms off the motherboard (bad, but not horrible) or scrape components off the back of your brand-new videocard (devastating).*

6

MATCH THE DIMMS

It's an age old-question: To achieve full dual-channel capability, do you put the pair of RAM sticks into the colored slots that match or the slots that don't match? Rather than sitting there pondering the issue, we suggest you read the fracking manual; otherwise, you might accidentally configure your system for single-channel mode.

7

USE THE POWER PLAY

New-generation mobos need more power than their predecessors, so don't hook up just the blocky main power connector—plug in the four-pin ATX 12V power connector, as well, along with any auxiliary ports that need to be filled. If you're not sure whether to plug peripheral power connectors into the board, consult your mobo manual for guidance.

8

TWIST IT OUT

If you're removing your old processor to install in your new board and it won't budge, don't keep pulling on the heatsink. If you slowly twist the heatsink in the socket, the seal should eventually break and allow you to pull the heatsink off. If you just yank on it, you're liable to pull the CPU straight out of its socket. Ouch! ■

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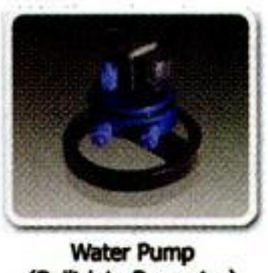
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- 92mm fan inside the FHS maximizes airflow and makes installation easier.
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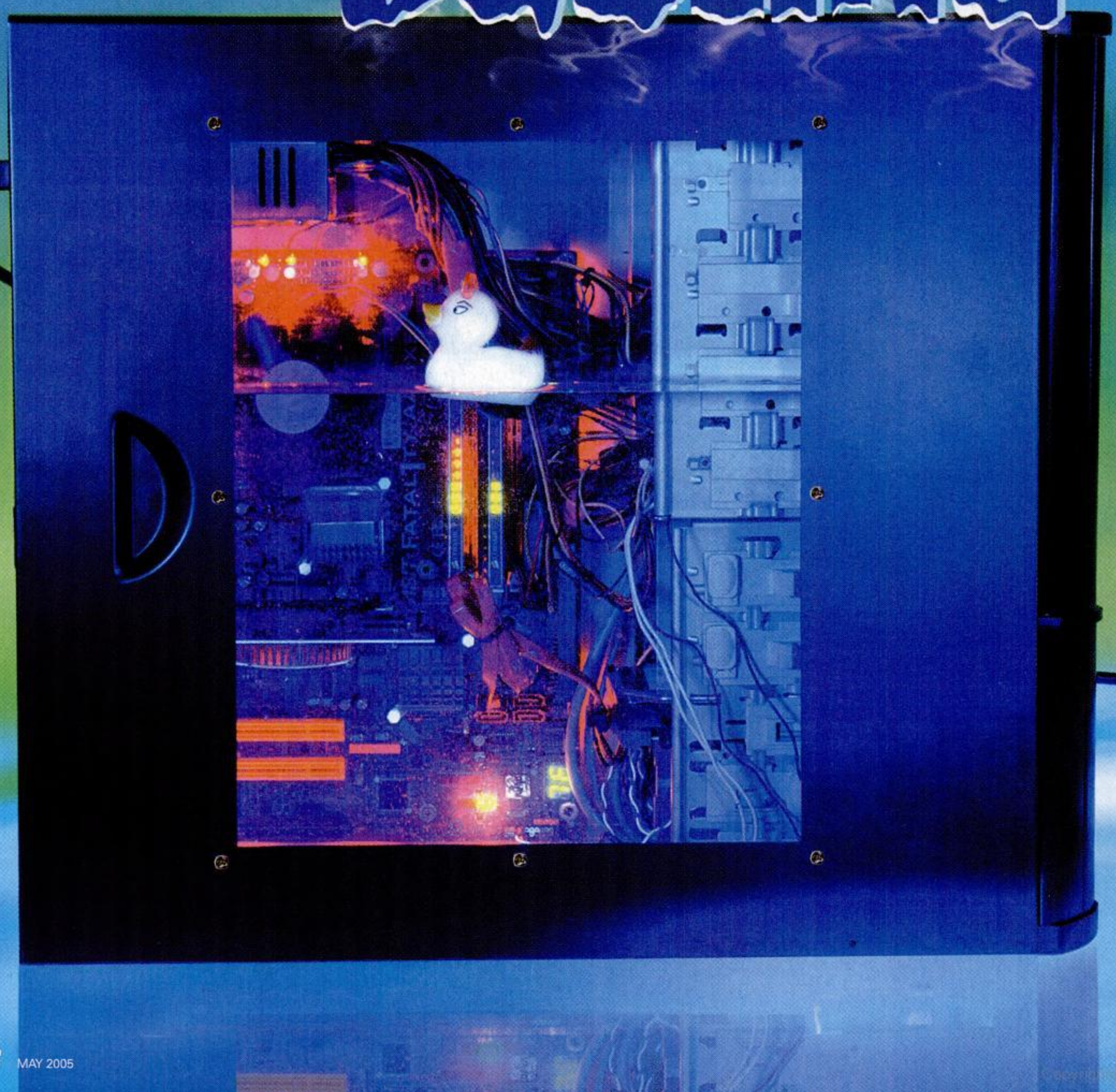
Chill Out with WATER COOLING

BY JOSH NOREM



Serious overclocking requires serious cooling. Maximum PC dips its toes into four do-it-yourself water-cooling kits that promise to help you squeeze every last drop of performance from your rig

Let's face it—today's heatsink-and-fan combos just don't cut it for major overclocking. They're either too inefficient to maintain a stable temperature, or loud enough to drown out the footfalls of approaching Combine soldiers. You need water cooling, and you can get it one of three ways. You can buy an expensive, preconfigured water-cooled PC; you can purchase a case with a built-in water-cooling system; or you can bag yourself a water-cooling kit and install it in the PC you already own. This last approach is the most practical for most folks, but we don't blame you for being apprehensive about accepting on faith that whatever kit you pick will be rugged, reliable, and worth the effort of installation. And so this month, *Maximum PC* puts its own PCs at risk, so you don't have to. We'll explain how water cooling works, tell you what you need to install a water-cooling system, and walk you through the results of our extensive hands-on evaluation of four kits. If, after you've read the reviews, you decide to take the plunge, we'll share 10 pitfalls we encountered while building these kits—and offer tips on how you can avoid them. With that, we invite you to dive in: The water's fine.

WATER COOLING IN ACTION

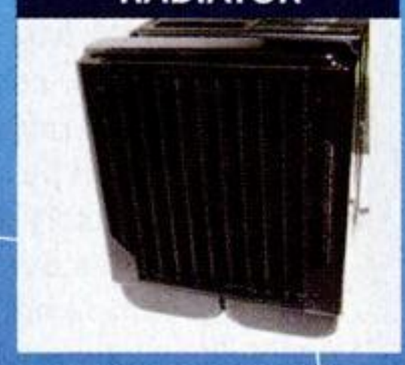
Water cooling is such an easy concept that even dogs get it: Run through the sprinkler on a hot day and you'll cool off. Of course, you can't just hose down your CPU and call it a day. Water-cooling kits operate by pumping water through a closed circuit, wicking away heat from your PC's vital components. Here's how each part in a typical water-cooling kit contributes to that objective.

RESERVOIR

WATER PUMP

WATER BLOCK

RADIATOR

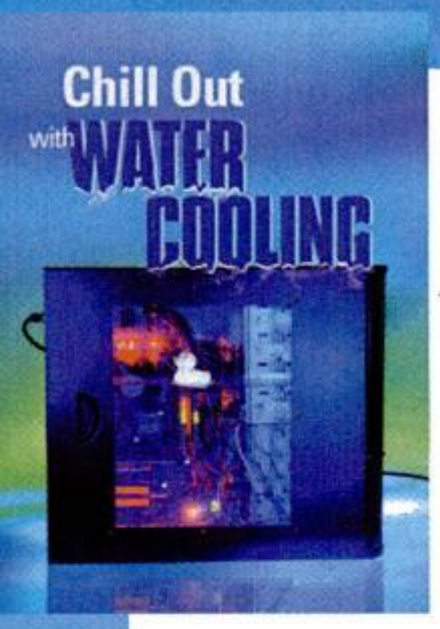


WATER PUMP The water pump is the engine that pushes water around the circuit. The pump sucks water in through one port and pushes it out another, by way of a motor that spins an impeller. Two primary characteristics differentiate water pumps: The amount of water they can move through the system, and the amount of noise they create in the process. The higher the pump's flow rate and the wider the diameter of tubing the system uses, the cooler your system will be. You want a pump that moves the most amount of water while producing the least amount of sound.

WATER BLOCK A water block is a copper heatsink that mounts directly to your CPU, GPU, chipset, or other heat-generating component. Water enters the block through an inlet port, and the water is then pushed through small channels that curve around inside the block. This design allows the water to absorb as much heat as possible before exiting the water block via an outlet port.

RESERVOIR Most cooling kits include a reservoir, which is just a small holding tank of distilled water (usually mixed with additives that promote heat transfer and prevent corrosion). The reservoir is always placed at the highest point in the cooling circuit, above the pump and water blocks, so gravity and pressure can help its contents flow down into the circuit, typically directly into the water pump's inlet port.

RADIATOR When the water gets to the radiator, it's plenty warm and needs to be cooled. The radiator brings down the temperature by sending the water though a snaking series of interconnected tubes within its fins (the flat surfaces that spike out of the unit). The radiator's fins increase the surface area over which heat is distributed, which helps cool the water inside the tubes more quickly. A large, high-volume fan, meanwhile, blows cool air through the radiator, wicking away the heat collected in the pipes. ➔



OUR TESTING METHODS

Each kit was installed in a Cooler Master Cavalier ATX mid-tower case, using an Abit AA8XE Fatal1ty motherboard and an Intel LGA775 3.6GHz P4 processor. (All kits tested work with both Intel and AMD CPU models.) We evaluated each kit based on four criteria:

Cooling Performance

Once the kit was installed, we measured the CPU temp at idle. We next ran *CPU Burn-in* (**http://users.bigpond.net.au/cpuburn/**) for one hour with a 100-percent load on the CPU, and then measured its temperature at the end of the cycle. To measure the effectiveness of water versus air cooling, we compared the water-cooling temperatures with those from a stock Intel heatsink/fan (HSF) and, alternately, a high-velocity aftermarket fan from Thermaltake—the Jungle 512.

Ease of Installation

This is a necessarily subjective measurement, but it's a crucial one nonetheless. We evaluated each kit for the quality of the manufacturer's documentation, how well the kit's parts were labeled, and how easy it was to install the sucka. This could very well be the deciding factor when choosing among kits that perform similarly.

Overclocking Potential

Because water cooling facilitates lower overall temperatures than air cooling, it's often used by overclockers to reach astronomic clock speeds. We tested each kit for its overclocking ability and scored some impressive results, but we did encounter some limitations related to the CPU and motherboard we used. In other words, your mileage may vary.

Noise Level

One of the big advantages of water—versus air—cooling is that it doesn't require as many notoriously noisy fans. Still, most kits include a fan to draw air over the radiator, and not all of the kits include enough water blocks for all the components you'll want to cool. Once we installed a kit, we measured its sound output from 18 inches away using a decibel meter.

Swiftech H2O-120

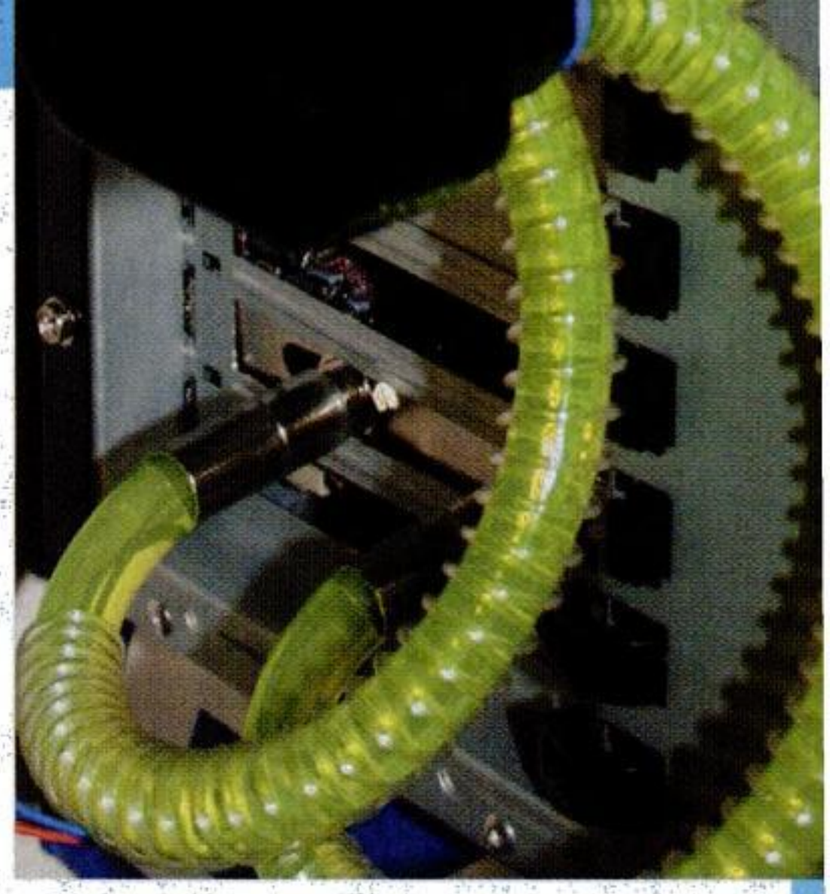
The Swiftech H2O-120 kit stands out in this roundup because of its modular design: You can purchase a CPU-only configuration today, and then buy additional water blocks and radiators to expand the system according to your needs. The kit we tested included water blocks for the CPU and GPU, a 120mm radiator with a fan, a coolant reservoir that mounts in a 5.25-inch bay, and a 12V pump. The kit uses 1/2-inch tubing with "cool-sleeve" coils to prevent the formation of kinks that would impede water flow, and it uses green UV-reactive (aka "glow-in-the-dark") coolant that's intended to be mixed with distilled water. One very nice touch is that the 120mm fan/radiator assembly can be mounted on a wide range of exhaust-fan mounts, so it will work with just about any ATX enclosure.

The Swiftech unit is fabulous hardware that performs very well, though installing it is a bit of an adventure that requires extreme levels of patience and diligence. And the problem stems from the very modularity we praise the kit for: Rather than provide a step-by-step walk-through for the particular kit you've purchased, the H2O-120 comes with installation instructions for the *entire catalog* of Swiftech parts.

As much as we appreciate that Swiftech provides a printed manual—not all the vendors in this roundup do—we *don't* appreciate having to wade through 41 pages searching for the nuggets of hard information we need to install something.

The Swiftech kit warns you—perhaps a little too late—that the H2O-120 is "for expert users," and they're not kidding. Installation of the kit requires a lot of patience and care, making the Swiftech kit easy to install for those that know what they're doing, but intimidating to the average Joe who is looking to install his first kit. In our opinion, a simple overhaul of the manual would have made this a fine kit for all parties.

The internal reservoir is made from molded plastic and conveniently mounts in a 5.25-inch bay. To add more water, you just pull it out, unscrew the cap, and fill 'er up.



The H20-120 uses "cool-sleeve" coils throughout its interior and exterior to prevent the tubing from kinking; kinked tubes will impede water flow and severely reduce cooling efficiency.

TEST RESULTS

Cooling performance

The H20-120 performed quite well, registering the second-lowest temperature delta from idle to full load. Under full load it was only hotter than the stock HSF at idle by four degrees Centigrade.

Ease of installation

This kit wasn't *that* hard to install, but the 41-page manual would be very intimidating to water-cooling newcomers. All the information you need is in there, but you have to hunt to find it.

Overclocking

This was the best overclocker in the bunch, allowing us to ratchet up our 3.6GHz P4 all the way to 4.12GHz. Not bad.

Noise output

Because the 120mm fan mounts on the outside of the case, noise output increased from the stock HSF by four decibels, but we think that's an acceptable trade-off for the overclocking prowess.

MAXIMUM PC VERDICT 8

$260, www.swiftnets.com

The Swiftech VGA water block prior to installation.

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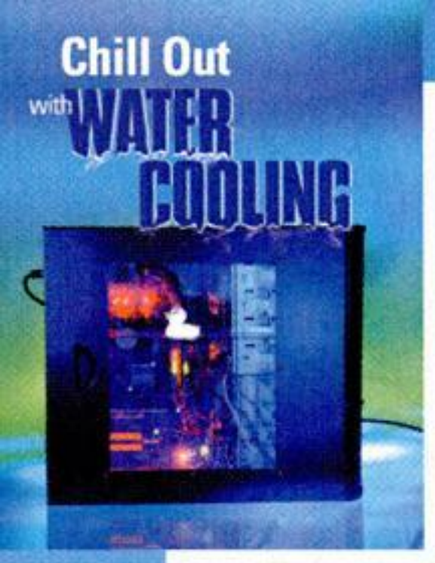


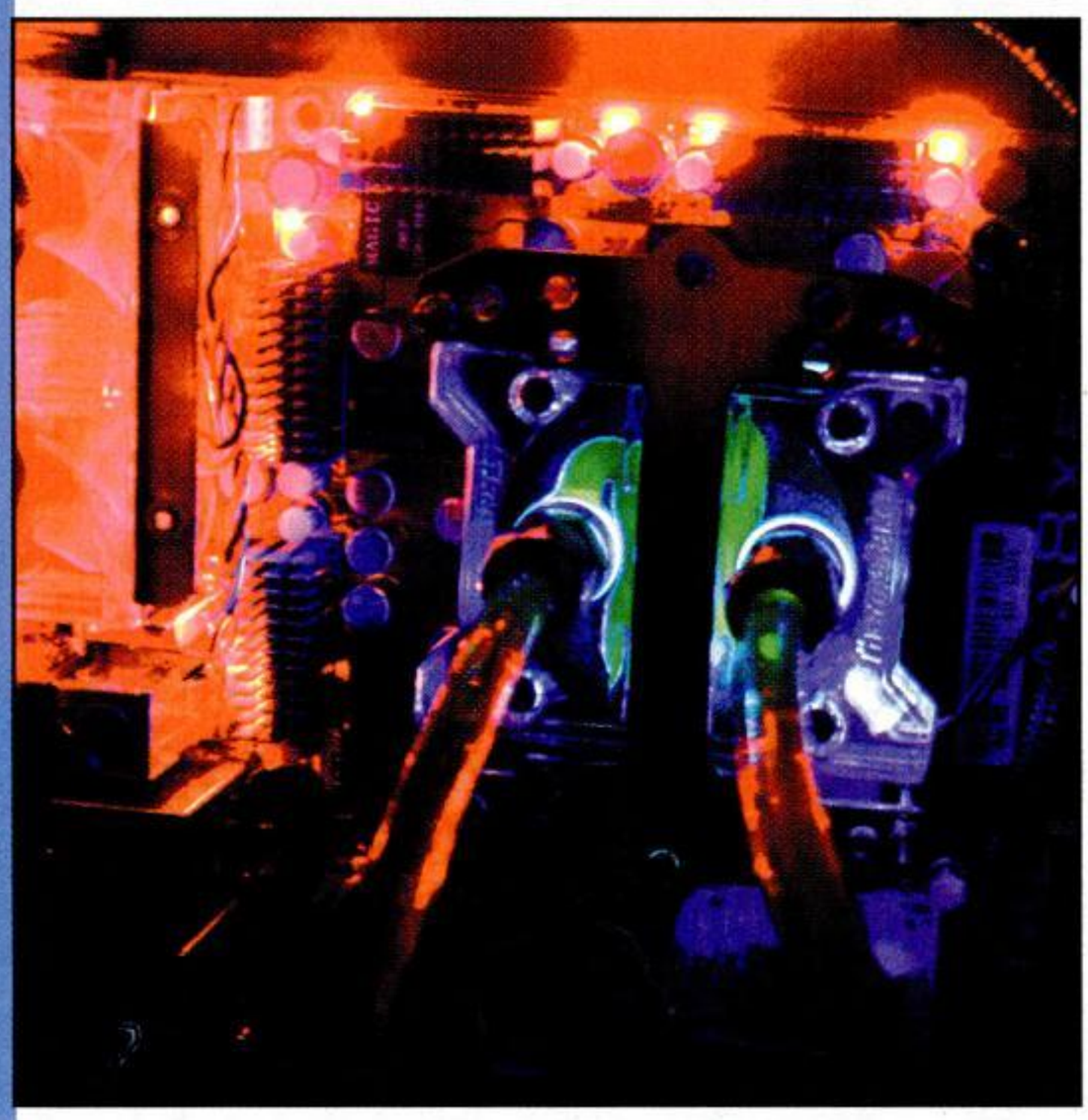
Thermaltake BigWater

Thermaltake puts a unique spin on water cooling with a kit that doesn't require a reservoir after the initial installation (oh, and there's also that bling water block with the clear acrylic cap and nifty blue internal LED). Besides the extra-fancy CPU water block, the BigWater kit includes a 120mm fan and radiator, a 12V pump, 1/4-inch tubing (the smallest diameter tubing in this roundup), and a reservoir that's removed from the system once it's filled with a cocktail of distilled water and UV-reactive coolant.

If you know what you're doing, installation is rather straightforward; if this is your first time installing such a kit, however, the instructions will leave you utterly baffled. Many of the pages in the postcard-size, black-and-white manual are crammed with six or more individual steps, complete with postage stamp-size illustrations. We had to laugh when we saw the notation "see above" in many of the instructions, because you'd need a magnifying glass to make out the details in the image. To make matters worse, many of the instructions are not only as clear as mud, but entire installation steps appear to have been left out. This state of affairs forced us to improvise at times based on what we thought we *should* do, and that's a very scary proposition when you're routing water in close proximity to thousands of dollars worth of hardware.

We also take issue with the LGA775 mounting hardware, which is ridiculously difficult to secure. Instead of using thumbscrews or large nuts (like every other kit we tested), this kit uses teeny, tiny nuts that are too small to tighten by hand. Thermaltake doesn't provide any tools in the kit, and we didn't have a nut driver anywhere near that small in the Lab, so we found ourselves using a pair of needle-nose pliers to tighten them down. Needless to say, this rendered installation excruciatingly difficult.

The radiator/fan assembly is also whack: If you install it outside your case, the fan blows the air—which is now warmer than room temperature after traveling through the radiator—right into your case. We tried moving the fan and radiator inside the case, but it was much too large to fit. As a result, this kit's temperature measurements were the highest of the bunch.



The BigWater's copper water block has a clear acrylic lid with a blue LED that looks totally bitchin' all lit up.

TEST RESULTS

Cooling performance

The BigWater achieved temperatures that were better than the stock HSF, but they were still the highest temps in this roundup. We blame this result on two design blunders: The aforementioned radiator/fan assembly that blows warm air into your case, and the narrow 1/4-inch tubing that restricts the amount of cooling water that flows over the components.

Ease of installation

The instructions are a joke: They're difficult to read and comprehend, and they omit entire steps; as a matter of fact, the entire installation process was grueling.

Overclocking

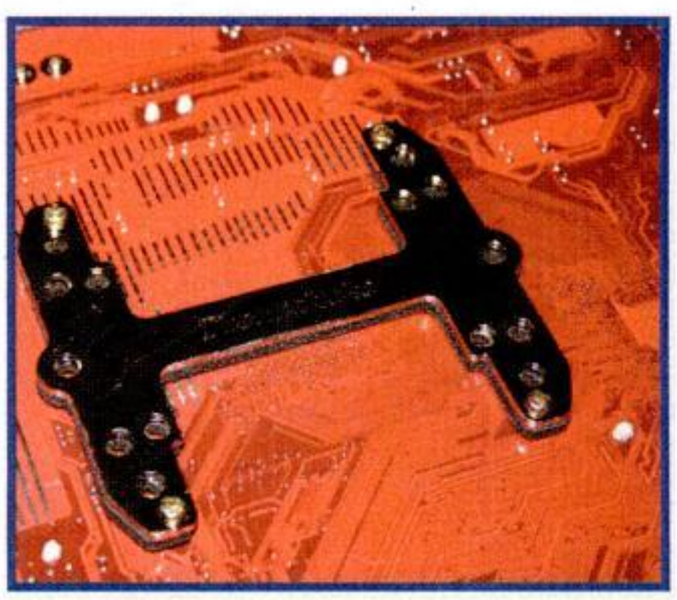
We achieved a better-than-average overclock of 450MHz, which is surprising given the kit's middling cooling performance.

Noise output

The fan-speed controller knob is handy, but since it's located in a PCI slot, you'll have to give your PC a reach-around to access it. With the knob turned up all the way, it was five decibels louder than stock (loudest in the group by a hair); turned down to the other extreme it was the quietest, at 63db.

MAXIMUM PC VERDICT 4

$120, www.thermaltake.com



In order to install this kit on an LGA775 system, you must remove the mobo and install this retention plate beneath the CPU area.

This 120mm fan is adjustable from 1,300rpm to 2,400rpm; unfortunately, the control knob is located in the back of your PC amid the PCI slots.

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Corsair Cool

Corsair's Cool kit is essentially a rebranded Swiftech kit (reviewed on page 50), but Corsair's version is much easier to install and work with thanks to well-crafted documentation that provides thorough step-by-step instructions.

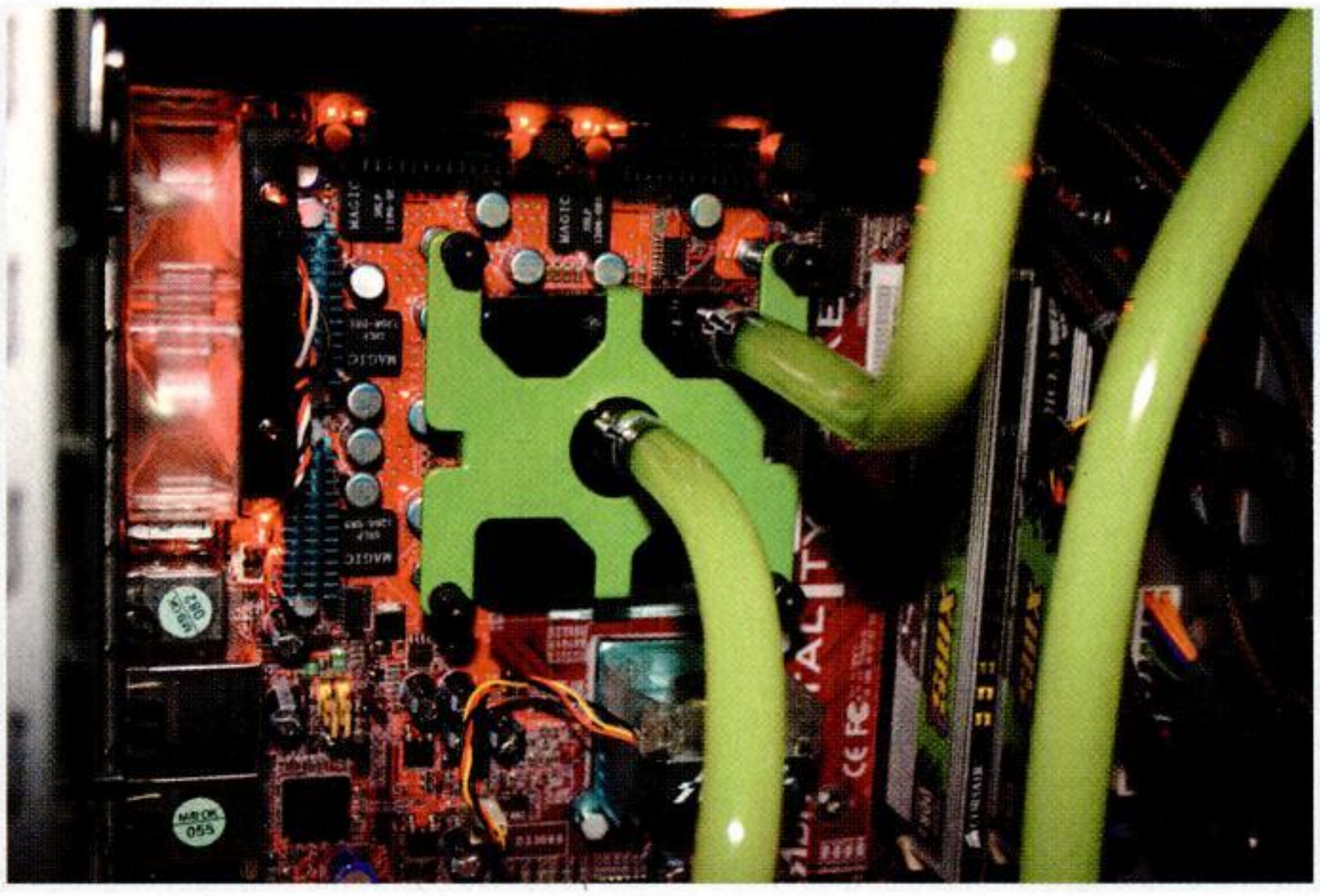
This is a CPU-only cooling kit; as such, it includes just a single water block—VGA and other coolers are not available. The kit also includes a reservoir that can be mounted in a 5.25-inch bay, a 12V pump that affixes to the bottom of your case via an adhesive pad, and a fan and 120mm radiator. The distilled water and UV-reactive coolant is carried via 3/8-inch tubing.

The Cool kit afforded us the second-easiest installation of the roundup, thanks to easy-to-understand instructions and large, full-color photos. A few disappointingly vague instructions are what kept it from being the easiset kit to install: In one example, the manual was missing a crucial detail regarding the orientation of the water-block retention plate on our LGA775 formfactor processor. When we fact-checked this with Corsair, we were told the manual has since been updated to reflect this important change (fat lot of good that did *us*). We also inadvertently installed the fan grille upside down, which caused the fan to stop moving. Here again, clear instructions could have helped us avoid this mishap.

Corsair includes Swiftech's "Radbox" radiator mounting system, which lets you affix the radiator to practically any size fan mount. Even if your case has only a wee 80mm exhaust fan, you'll be OK—simply ditch the fan and use the mounting holes to install the radiator.

In our tests, the Cool system performed quite well, delivering the second-lowest overall temperature at idle, and the lowest temperature at full load. Amazingly, the Corsair kit's temperature at full load was lower than the stock heatsink/fan at idle (when your PC is doing *nothing*).

That's impressive performance, to be sure, and if not for the few fairly serious omissions in the documentation, we'd have recommended this system for beginners and experts alike. As it stands, this kit seems ideally suited for experienced users and semi-newbs who simply want to replace the noisy fan hovering over their CPU.



The Cool kit certainly looks cool, and it acts cool too, pumping UV-reactive coolant into an all-black copper water block.

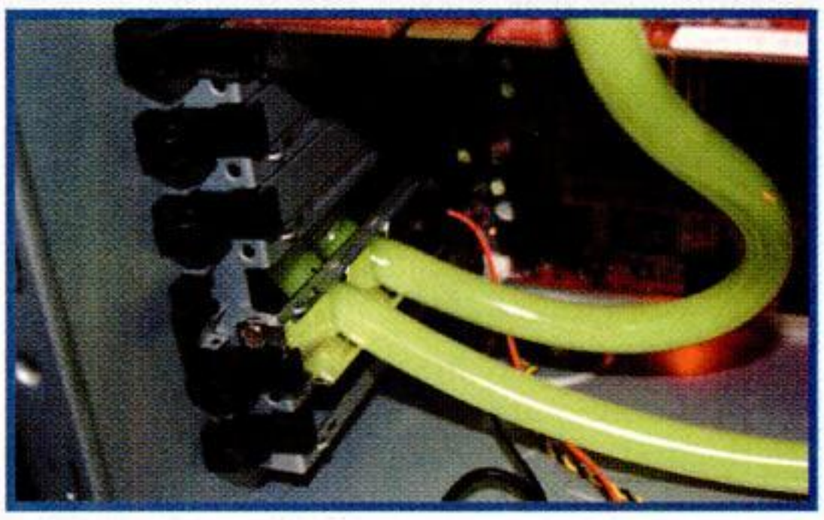
TEST RESULTS:

Cooling performance

The Cool kit is aptly named: It exhibited the lowest temperature delta from idle to 100-percent load of any kit in the test. Its idle temp of 38° C was four degrees lower than the stock Intel cooler, and its full-load temp of 44° C was the lowest in the roundup.

Ease of installation

This kit was the second-easiest to install thanks to thoughtful, step-by-step instructions. Still, there were a few omissions that caused us some serious headaches. And because the documentation is provided only in PDF format, you'll need to either print it out beforehand or follow along on a laptop.



Two stretches of tubing are routed to and from the radiator via this PCI-slot pass-through connector.

Overclocking

We scored just a 400MHz overclock—that's only 40MHz higher than we achieved with the stock cooler. This makes the Cool kit the least-impressive of the bunch in this respect, which is odd given its stellar temps.

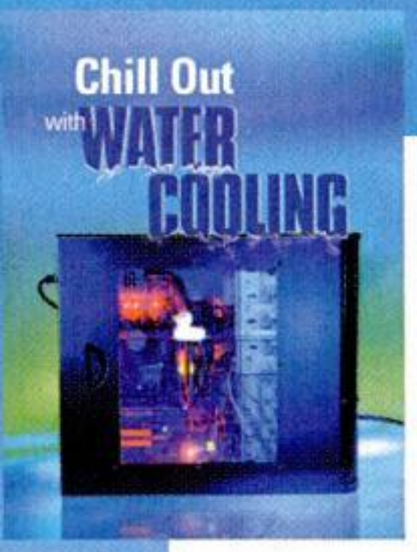
Noise output

Because this kit requires a 120mm fan to be mounted *outside* the case, it was four decibels louder than stock.

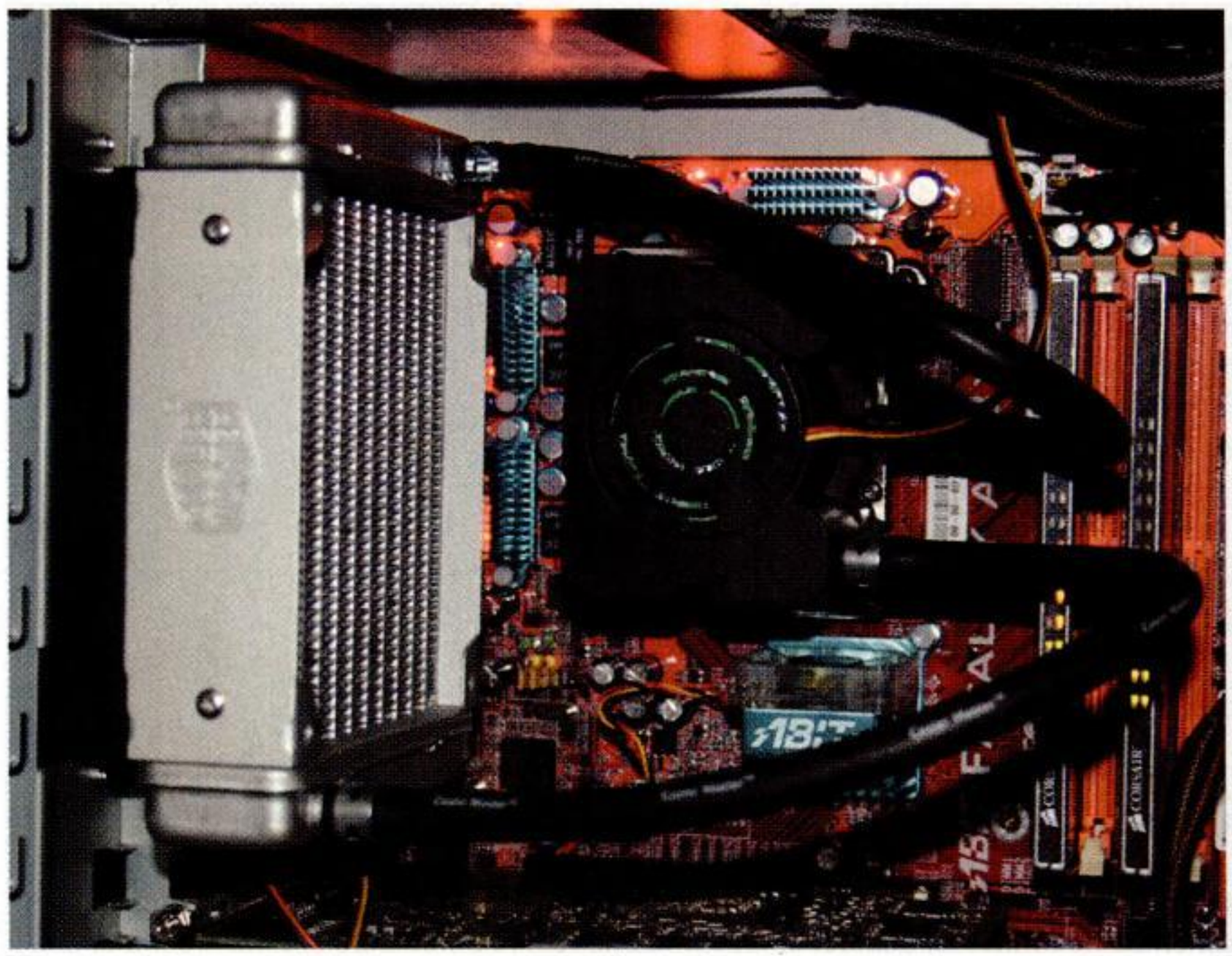
MAXIMUM PC VERDICT 8

$200, www.corsair.com

The radiator assembly is a honkin' sucker that mounts to the rear of the case. A 120mm fan mounted right behind it sucks air out of the case and blows it through the radiator



Cooler Master Aquagate Mini



The Aquagate Mini uses a novel design that integrates the water block with the pump and reservoir. There's no reservoir to fill, no tubing to route, and no pumps to bleed.

Every other kit in this roundup uses a standard pump/reservoir/radiator/water-block design. The Aquagate Mini eschews this convention in favor of an incredibly simple and compact two-piece cooling unit. Yes, there's just two pieces: There's the typical radiator/fan assembly, but the water pump and reservoir are all integrated right on top of the water block. The Aquagate Mini significantly reduces case clutter and tubing hassles, and it simplifies the process far better than any other kit in this roundup.

The tubing is factory-clamped and liquid is included, so you never need to fill a reservoir or worry about leakage or mishaps. It's also the only kit in the roundup that is meant to be installed entirely *inside* the case, which significantly reduces noise levels. Setting the speed-adjustable fan to its lowest setting renders this kit astonishingly quiet.

Installation was the easiest in the roundup, partly because the kit doesn't require you to route any tubing or fill reservoirs, but also because Cooler Master has streamlined the CPU-mounting process into just four small steps. The kit provides all the tools you need to tighten everything down (this was the *only* kit we tested that came with its own tools). Mounting the CPU block took about 10 minutes, and bolting the fan to the side of the case took another five minutes—awesome compared with the two-plus hours required to install each of the other kits in this roundup.

After all the fumbles we experienced with the other kits, we were thrilled to find that at least one manufacturer has done the water-cooling kit right. It's the least expensive, the easiest to install, very quiet, and it delivers excellent performance. The only drawback is that there's no way to add a VGA or chipset cooler to this system down the road. But as far as CPU-only kits go, the Aquagate Mini is our hands-down favorite.

TEST RESULTS:

Cooling performance

The Aquagate Mini posted solid scores that were very similar to the competitors'. The CPU got up to 60° C with the fan turned all the way down, but the rig was totally silent and cooler than with the stock HSF.

Ease of installation

Installation was a snap—by far the easiest in the roundup. Cooler Master uses an innovative screw-down mounting method for LGA775 formfactor processors that requires just four bolts, which you secure with a tool that's provided in the kit. With that painless task out of the way, we installed the fan with four screws and were finished.

Overclocking

The Mini registered the second-highest overclock in the test: 4.08GHz.

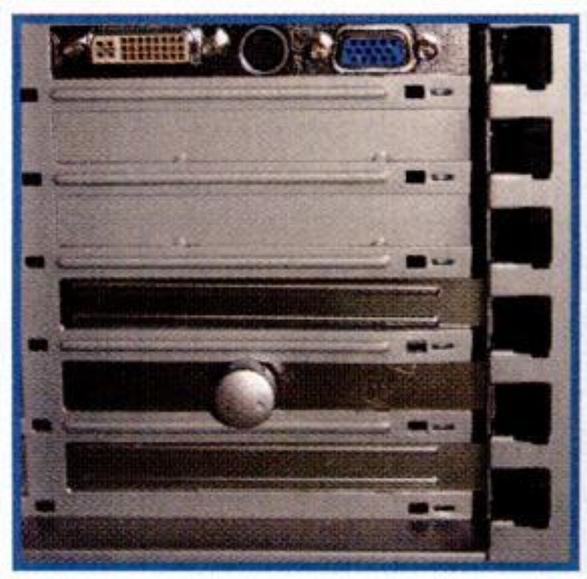
Noise output

Because it has an adjustable fan, we tested the kit with the fan set on low and then on high. It's totally silent on low, but quite loud when turned up all the way. It's also the only kit that mounts entirely *inside* the case, which goes a long way toward reducing noise.

MAXIMUM PC VERDICT 9

$100, www.coolermaster.com

The fan can be mounted on either side of the radiator, so you can modify the installation according to your case's design.



The Aquagate Mini is one of two kits that offer an adjustable radiator fan; when set to low, this was the quietest kit in the group.

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Water You Waiting For?

Carefully consider the pros and cons of water cooling before you take the plunge

THE GROOVY PROS

As our testing shows, water cooling has definite tangible benefits over traditional air cooling. CPU temperatures dropped dramatically with the addition of a water-cooling kit, and even after an hour running under full load, they never rose far beyond the idle temperature of the stock air-cooled setup. Water cooling is so efficient that CPU temperatures will never fluctuate as much as with air cooling. Thus, water cooling is also good for overclocking; if you're already ambitiously overclocking your machine by virtue of a monster heatsink/fan apparatus, water cooling is a worthy alternative.

Water-cooling kits can also reduce overall system noise—at least in some instances. In our tests, three of the four kits used an external radiator, and although the 120mm fans included with these kits have a fairly slow rotation rate, it's a zero-sum game when your interior 120mm fan is replaced with an exterior fan of the same size and dimensions. Noise levels for the internally installed kits, however (including the Aquagate Mini, which also has an adjustable-speed fan), were incredibly low.

Finally, adding a kit such as one of these to your system *can* be a lot of fun—especially if you're patient—and you'll gain an appreciable performance boost. If you're like us and you dig strippin' your PC down to its naked mobo and rebuilding it with fancy, never-before-tried technology (to you, at least), you'll swell with pride as your PC comes back to life with water coursing through its veins.

THE UNSETTLING CONS

Unfortunately, water cooling isn't *all* fun and games; there are a few downsides when compared with conventional air cooling. The first is price: The cheapest kit in the roundup costs more than twice what you'd pay for a simple, aftermarket heatsink/fan combo. Some of the more lavish kits cost upwards of $300—a pretty penny indeed.

Second, some of these kits are much harder to install than they need to be, thanks to incomplete or incompetently written instruction manuals. Several of the kits we tested were accompanied by written directions containing egregious omissions, which is incredibly maddening: When your PC's ass is on the line, the last thing you want to experience is doubt or uncertainty.

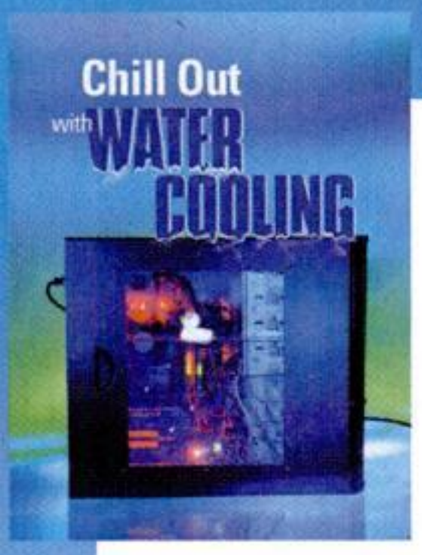
You should also ask yourself this question before navigating these waters: Do you really need to water cool your PC? If you're not overclocking and your system is stable, the answer is probably no; then again, do you really *need* 4GB of RAM? Or a window in the side of your case? Or lights all over its interior? Probably not, but it's fun to mod your PC and make it different—especially when the mod enhances your PC's performance.

Here's the bottom line: These water-cooling kits can be a pain in the butt to install; they require careful, methodical planning; and a full system tear-down; but they're worth the effort if—like us—you like getting your hands dirty inside your PC every once in a while. ➔

Water-Cooling Kits Compared

KIT	Available water blocks	CPU temp at idle*	CPU temp at 100-percent load*	Overclock achieved with 3.6GHz CPU (in GHz)	Noise level (in decibels)	Price
Corsair Cool	CPU	38	**44**	4.0	69	$200
Swiftech H2O-120	CPU, VGA, chipset	**36**	46	**4.12**	68	$260
Thermaltake BigWater	CPU	39	53	4.05	70 (63 on quiet mode)	$120
Cooler Master Aquagate Mini 120	CPU	37	47	4.08	**64** (67 with fan on high)	$100
Stock HSF	N/A	42	61	3.96	65	N/A
Thermaltake Jungle 512 fan	N/A	43	64	3.96	68	$30

* All temperatures are Celsius. Best scores are bolded.



10 Water-Cooling Pitfalls—and How to Avoid Them

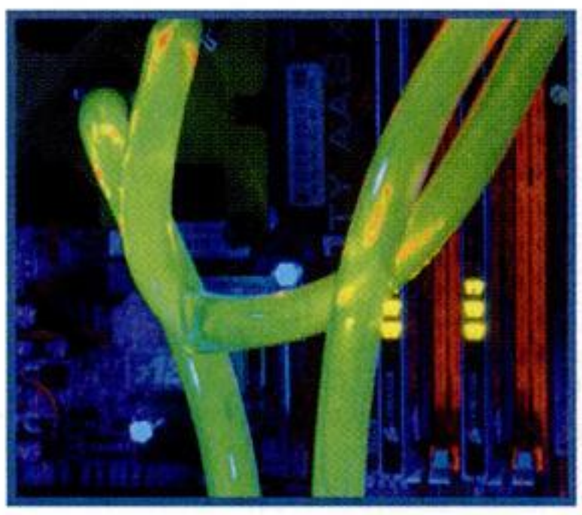
We endured 10 "D'oh!" moments, so you wouldn't have to

1. RTFM (read the freakin' manual)

How we learned this: The instructions for these kits aren't printed out just for your amusement—they are absolutely crucial to the kit's successful implementation. Building one of these kits is equivalent to designing a circuit, and every portion, from the radiator to the pump to the water block, must be correctly installed or there's a good chance the kit will either not function at all or won't function at its full capacity. There were numerous times during testing where we experienced issues with certain kits, and we always traced the problem back to a missed step, an incomplete step (typically due to a murky instruction) or something similar. The point is clear: Follow the instructions as if your PC's life depended on it!

2. Don't Get Kinky

How we learned this: We didn't experience any *severe* kinking problems with any of these kits, but we came to the conclusion that the "cool-sleeves" tubing offered with the Corsair and Swiftech kits do an excellent job of preventing circulation-plugging kinks anywhere in the lines.



A gnarly kink showed up on the tube coming out of the CPU water block. This forced us to remove and re-cut the tubing.

3. Read Ahead

How we learned this: When installing the Corsair kit, we performed each step in the process as we read it. One of these steps read "remove one of the [adhesive] pad's protective sheets..." so we did. And then the very next step in the manual said, "do not peel off the protective sticker on the adhesive surface...." Whoops.

4. Make a Plan

How we learned this: We built each of these kits with the water traveling from the radiator to the CPU water block, and had no problems at all; but it would be interesting to experiment with different configurations, such as connecting the water pump to the CPU, to see which works the best.

5. Have a Lifeline

How we learned this: One of the kits wasn't booting, and we were *convinced* we had installed it correctly. We finally asked for help from a co-worker, who walked us through the process from step one all over again. As it turns out, we just needed to look at the directions a bit more closely: For one step, we had been following the directions for installing the kit on what the manual had labeled a "P4." When we turned to the next page, we found a set of very different directions for installing the kit on an "LGA775" CPU, which is also a P4. The previous directions were for a Socket 478 P4.

6. Call Tech Support

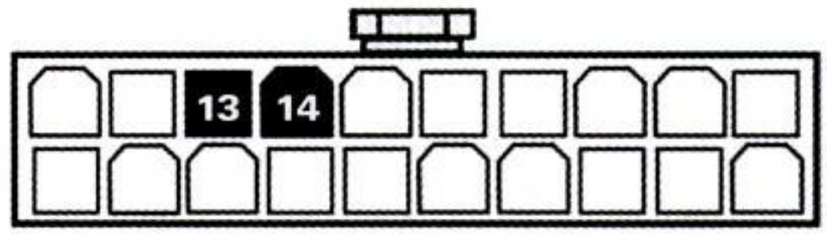
How we learned this: We were seeing unusually high temperature readings with the Corsair kit, so we contacted the company and asked about it. As it turns out, we had the water block installed correctly, but the retention plate was upside down. In our defense, the plate looks perfectly symmetrical at a glance, and there was nothing in the manual explaining that the plate *had* to be mounted a certain way. We would never have figured this out on our own, but a quick call to tech support fixed the problem quickly and effectively.

7. Measure Twice, Cut Once

How we learned this: One of the kits requires a few inches of slack in the line to the reservoir, so we cut it long. This was perfect when the reservoir was pulled out, but when we pushed it back into the case, the line kinked and we had to re-cut it. Cutting the tubing too short would have been an even bigger hassle.

8. Do a Dry Run

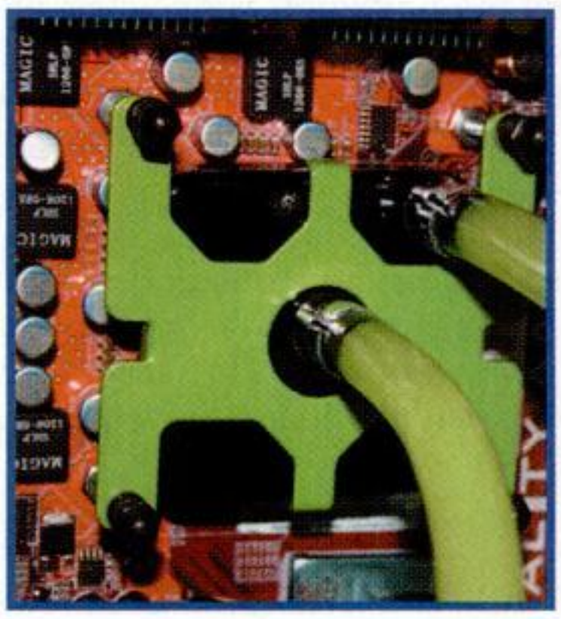
How we learned this: None of the kits recommend doing a dry run, but we think it's a good idea. We recommend assembling the entire kit and running it until the circuit is full of water before you power up your PC. This is a good way to test for leaks! Simply attach just the pump to the power supply, short-out pins 13 and 14 with a paper clip, and turn it on. Water should begin pumping through the system immediately. Once it's full, and no leaks are found, connect the PSU to the motherboard and fire it up.



To run your cooling circuit without endangering any components, hook it up to the PSU, short these pins, and then turn on the sucker.

9. Watch for Capacitors

How we learned this: Even though there's a "no build" zone around the processor area, the water blocks are so large they can nudge up against a capacitor and still feel solidly mounted to the CPU. This happened to us while testing the BigWater kit, and we couldn't figure out why the CPU was running at 100° C. We finally removed the block, wiggled it a bit to make sure it was making good contact with the CPU heat spreader, and reattached it. Problem solved.



See all those capacitors sitting directly below the water block? If just one of them is making contact with the block, temperatures could rise more than 20°.

10. Mount the Pump Last

How we learned this: Corsair's instructions taught us this trick by telling us to not mount the pump until the very last stage of installation. It's very difficult to bleed the lines if you can't vertically orient the pump's ports. ■

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New from Bose, the most respected name in sound, this slim, sleek digital music system is ready to revolutionize the way you use your iPod and iPod mini.*

Bose SoundDock digital music system (shown with iPod mini)

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Ask the Doctor

Symptom ▶ Diagnosis ▶ Cure

YOU'RE GROUNDED

I heard I could record my collection of LPs onto CD. So I tried running a cable from my stereo receiver to the audio-in on my SB Live soundcard. When we played back the music from the computer, half of what was recorded was buzz. Do you have any suggestions for a clean sound?

—JEFF HORNING

Assuming the buzz is coming from the receiver and not from within your head along with the other voices, what you're hearing is electrical hum, which you can eliminate by grounding the receiver. Look at the back of your receiver; there should be a screw in the back labeled "Ground." Wrap a wire around this screw, and then attach the wire to a grounding source; one of the screws on the back of your PC should work.

There's another way around this problem. If your turntable has its own RCA-out jacks, you can attach a pre-amp to it and then record directly from that. Note that vinyl records are recorded with an equalization method called the "RIAA curve," which de-emphasizes bass so the record player needle doesn't vibrate and get jarred off the track. The bass is restored by the record player's internal circuitry. So make sure you buy a pre-amp that can compensate for the RIAA curve, or that your software can do so after you've completed the recording (check out Sony's *Sound Forge*, $70, http://mediasoftware.sonypictures.com).

VOLTAGE DISPARITY

My system has a PNY 6800 Ultra videocard in an Asus A8V with 4GB of RAM. The rig refuses to run for more than 10 minutes during online games before it freezes. PNY's tech support says voltage is the problem—that my 12V rails are running less than 12V. According to my BIOS hardware manager, I'm running at 12+V, but according to the Asus probe program, I'm running at just 11.551V. All the other voltage readings are very similar between the two monitors. I want to know which voltage monitor is more accurate. Any suggestions?

—VICTOR KNIGHT

Motherboard-based voltage monitors are inherently shaky. If you really suspect a lack of power, get a simple digital multimeter (which can be found at your local Radio Shack for as little as $20) and test the 12-volt rails' output directly. You can do this by setting your multimeter to DC or "auto" and measuring the voltage on one of the four-pin Molex connectors that power the hard drives.

Stick the black probe into the Molex port with the black wire (or ground line), and stick the red probe into the yellow port to measure 12-volt power. If you want to check 5-volt power, you can move the red probe into the red port. In one of our Lab's PC Power and Cooling supplies, the output registered at 12.1 volts, well within the spec.

Before you even measure, take a close look at the power cables you're using. If you connect too many devices to one line, you can have problems. Ideally, the two power leads plugged into your videocard should come from two different trunks. You shouldn't run any Y-cable or extensions to the videocard, as that can lower the voltage the card gets. Make sure you test several different trunks as well.

If the PSU's 12-volt output is fine, there are several other possible culprits. A component could be overheating. This might explain why you can play for 10 minutes before experiencing problems. Try running with the side of the case off and a room fan blowing into the PC. If it works past the magical 10-minute mark, you'll know to add additional cooling to your CPU and videocard.

If popping off the side of your case doesn't solve the problem, you could have a RAM timing problem. Corsair modules are fast, but they tend to have aggressive latency settings. You might want to try cranking back the latency to CL2.5 or CL3 to see if that solves the problem. Because Asus hasn't qualified any 1GB modules for that particular board, you should try running just two modules. If it runs with just 2GB, make sure you are running the latest BIOS. Manufacturers often use BIOS updates to correct compatibility problems between RAM and motherboard. If the BIOS update doesn't solve your problem, contact Corsair and Asus. Both should be able to address any compatibility issues.

BE LOYAL TO YOUR FANS

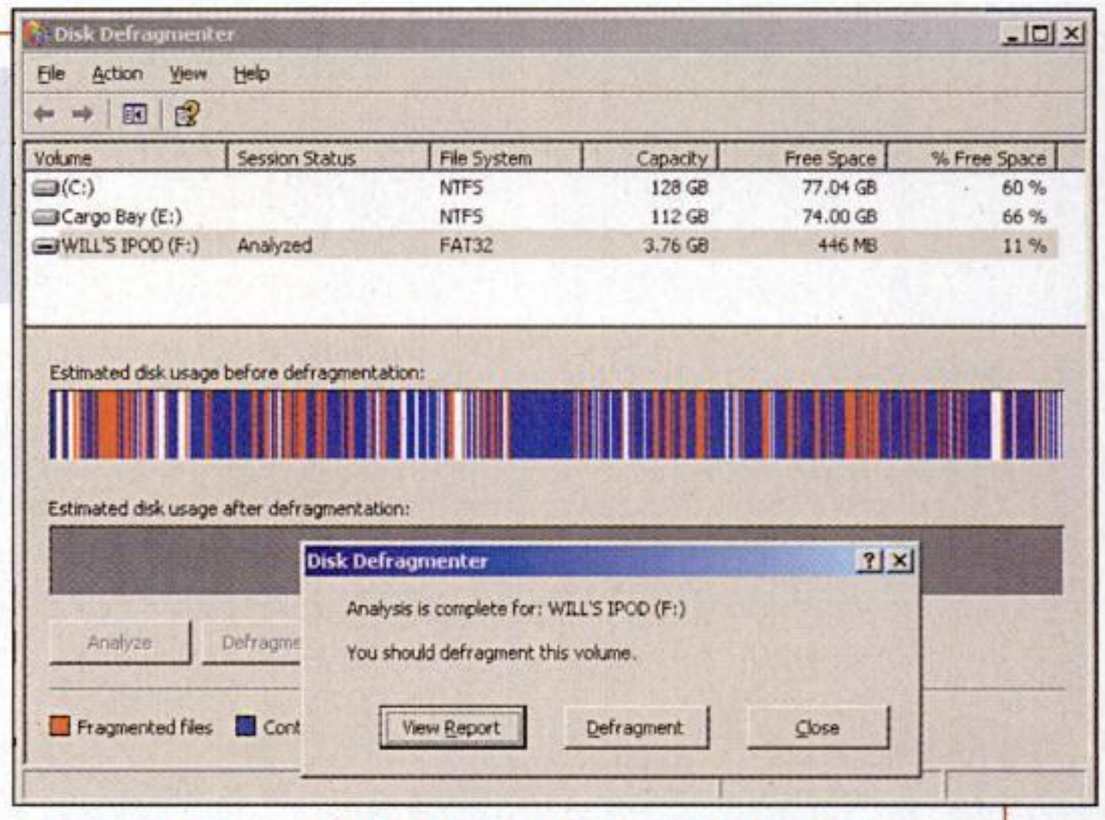
The other day, some strange noises were coming from inside my computer. I thought maybe this was a ball bearing in the fan going bad. Upon opening the case, I saw that the CPU fan was hanging by the power wires. On closer inspection, I noticed that

THE SWEET SOUND OF DEFRAG

As I was browsing my iPod through Windows Explorer, I realized I can defragment it from the Properties menu. The iPod uses a Fat 32 file system, so I imagine it can be defragged just like any other drive. Will it harm my iPod to defragment it? Is it even helpful?

—IPODSTER

Apple recommends against defragging your iPod, and we tend to agree with them. Although we've read some positive reports from people who performed a defrag on their units, when we ran an informal test on our own iPod, we saw no difference in performance when changing tracks or skipping songs. Because there's no real gain from defragging, we don't see a reason to run unsanctioned utilities on the player.


Disk Defragmenter
File Action View Help
Volume Session Status File System Capacity Free Space % Free Space
(C:) NTFS 128 GB 77.04 GB 60 %
Cargo Bay (E:) NTFS 112 GB 74.00 GB 66 %
WILL'S IPOD (F:) Analyzed FAT32 3.76 GB 446 MB 11 %
Estimated disk usage before defragmentation:
Estimated disk usage after defragmentation:
Analyze
Fragmented files
Disk Defragmenter
Analysis is complete for: WILL'S IPOD (F:)
You should defragment this volume.
View Report
Defragment
Close

Although it seems like it might be a good idea, you shouldn't defrag your iPod. Instead, simply restore the iPod using the Apple firmware update utility and then resync your music.

If you're really concerned about defragging your iPod, the Apple-recommended method is to use the *iPod Updater* program from Apple.com and select the "Restore iPod" option. This will wipe all of your music, and restore your iPod to its pristine state. Once that's done, you can resync the iPod with *iTunes* and be back in action.

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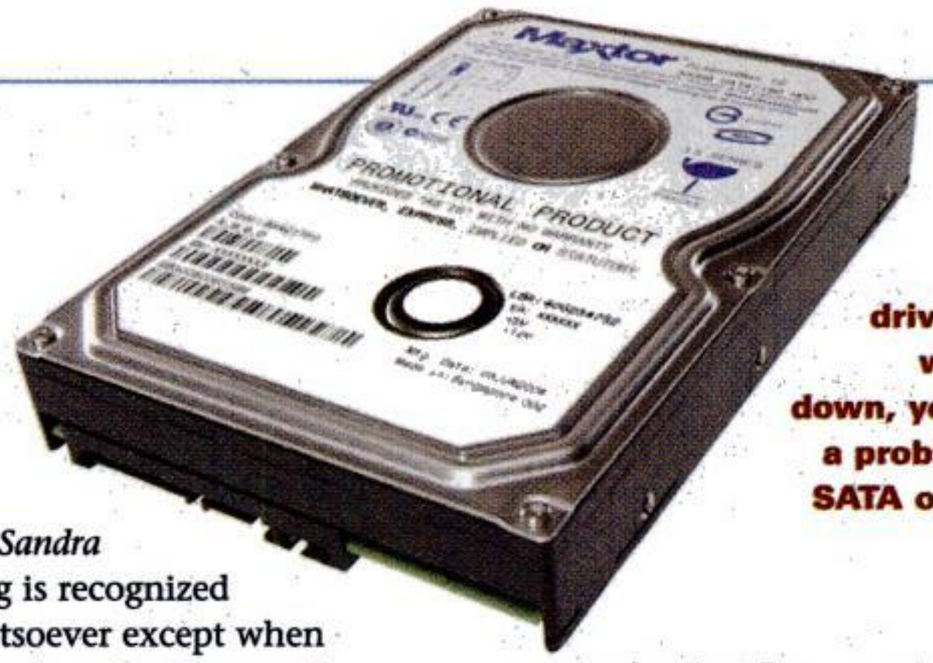
the plastic lip holding the fan to the motherboard was missing. It had broken, and apparently the fan vibrated enough to wear a flaw in the plastic. Is there any way to attach the fan or replace the clip? The processor is a 1.2GHz Athlon (overclocked to 1.3GHz) with a standard fan. The board and processor are past warranty.

—MASTER SGT. THOMAS YARON

The Doctor is a little confused. Do you mean the fan had come loose, or the entire heatsink? The Doc assumes it was just the fan, because had it been the entire heatsink, your hot Athy proc would have melted a hole through the back of your case by now. The easiest solution is to buy another heatsink fan for the system. Fans for the old Athlon platform can be had for less than $20 these days. In the meantime, you might try using a longer screw that will let the fan dig deeper into the heatsink. Or you can go ghetto and use a zip tie or a length of "100 mile an hour tape" (aka Duct tape) will hold the fan on until you can secure a new one. Just make sure you remember to check the tape to ensure it hasn't melted from the heat!

SHUTDOWN AMNESIA



If your hard drives go missing when you shut down, you might have a problem with your SATA or PATA device settings.

My computer works fine all the time, and it seems stable no matter what I'm doing. It can make it through *3DMark 03*, *SiSandra Burn-In*, etc. Everything is recognized with no problems whatsoever except when I turn off the computer. Any time I turn off the computer, when it starts back up, it takes forever to load and does not recognize that my 300GB Maxtor is connected—the Raptors in RAID 0 are fine. To fix the problem, I have to shut down the computer, clear the CMOS, restart the computer, reconfigure my BIOS settings, save and restart again, and then my Maxtor is detected. No problems ensue until I shut down the computer again. What makes this so strange is if I just restart the computer, it recognizes everything and there is no problem at all—it only happens when I shut down the computer completely.

—DAVID L. TRUBY

Your first course of action is to use a drive cable that's known to be good, if only to address the basics first. From your letter, it's not clear whether the DiamondMax 10 drive is in SATA or PATA trim. The Doc assumes it's SATA, but if it's PATA, try running all the devices in Cable Select mode.

You should also experiment with your BIOS settings. Your IDE channel might not be configured to its fullest potential. "Combined" or "Enhanced" mode will enable all SATA and PATA resources. If that doesn't work, the next step is to drop your overclock. SATA is especially sensitive to overclocking, and running just a tiny bit out of spec can freak out your SATA drives.

In fact, anytime you're having problems with an overclocked machine, it's a good idea to ratchet the rig back to stock speeds and see if that makes things work.

HOW FAIR IS APPLE'S FAIRPLAY?

Hearing about Apple's FairPlay in your January 2005 issue gave me hope for digital music, so I grabbed the latest version of *iTunes* and purchased my first song. To simulate a hard drive failure, I jumped on my laptop, installed *iTunes*, and tried to "Check for Purchased Music," thinking it would download all the music I have purchased from the music store. I was greeted with a notice saying I can only download my songs once and that I have to manually copy all my purchased music.

My hopes were dashed. Am I going to have to back up my library every time I purchase music?

—GREG MEISTE

Apple doesn't claim to provide multiple downloads for all the songs you buy via *iTunes*. The company recommends that you back up the original files. If you send an e-mail to Apple's tech support, however, you will be given a one-time option to re-download all your tracks.

This is yet another reason the Doctor recommends that you purchase your music on pure, unencrypted CDs, which you can keep and re-rip whenever you need without any DRM hassles.

WIDE-ASPECT GAMING

I'm not sure what the right forum is for this question but I was hoping for your opinion. I'm going to buy a 20-inch flat panel. The problem is, I'm not sure whether to get a normal aspect screen such as the Dell 2001FP or the wide aspect screen such as the Dell 2005FP. The display is primarily for playing games like *Doom 3*, *Half-Life 2*, and *World of Warcraft*. What do you think?

—T.M. CHICAGO

We've actually played all of these games with both normal 4:3 and 16:9 aspect ratio displays, and been pleased with both types. The secret is to use appropriate 16:9 resolutions in your game—1900x1200 and 1280x960 are both wide-aspect ratios. If you run 4:3 resolutions—1024x768 and 1600x1200—your display will have to stretch the pixels to fit, and your picture will be distorted. Of course, while all three of the games you mention work well with widescreen displays, there are other games that only offer 4:3 resolutions.

HYPER-THREADING WITH A SERVER?

Recently we were running some benchmarks on a dual-processor server with Hyper-Threading enabled. We were wondering what would happen if we turn HT off. So I did some research, and from all the articles I read, the general feeling seems to be that servers under a heavy load should disable HT. Even Microsoft recommends disabling HT in certain situations, specifically when dealing with its *Virtual Server 2005* product.

—HAMESH MANDODA

The Doc recommends that you go with the setting that works best for you. As you probably know, Hyper-Threading turns a single core into a virtual dual processor. Because it doesn't have the same resources as two discrete cores, you stand to lose some performance if the application wasn't designed to take advantage of Hyper-Threading. Hyper-Threading also adds some overhead, so that can result in a performance hit.

The answer, of course, depends on what application you're running and what you're doing. Not every processor or feature helps everyone, and the only way to really tell is to test it yourself. Still, as a general rule, the Doctor recommends that desktop users enable Hyper-Threading to "smooth out" the multitasking a normal computer user performs. ■

Is your Dream Machine turning into a nightmare? Are you waking up in a cold sweat because your PC can't cope with today's hardware? Look to the west, my sons and daughters, for the Doctor is here to save you. E-mail all your PC problems to **doctor@maximumpc.com**, and if your problem is dire enough, the Doc will come to the rescue.

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Experience A New World Of Digital Entertainment.

Enjoy Your Favorite Entertainment More Easily With All Your TV Shows, Movies, Photos, And Music At Your Fingertips With The Systemax PC Cinema With The Intel® Pentium®4 Processor With HT Technology

Systemax recommends
Microsoft® Windows® XP Media Center Edition 2005 For Home Computing And Entertainment

The 2005 PC Cinema Media Center PC. From Systemax.

Systemax The Great American PC Maker

Available At: TigerDirect.com

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How To...

A step-by-step guide to tweaking your PC experience

CREATE A UNIQUE Family Portrait

Mix photographic techniques with software trickery to make a magical childrens' portrait

MAXIMUM PC
TIME TO COMPLETION
02:16
HOURS MINUTES

BY GEORGE CAIRNS

Want to create a composition for your kids and family that they'll cherish forever?

What child wouldn't get a kick out of seeing him- or herself shrunk down to size in a scene from a favorite fantasy book?

The images you see here were shot in a studio, but you can easily recreate them. You'll get the best possible results with a proper lighting setup, but you can get reasonable results if you just shoot in a well-lit room and use a reflector to ensure that the children's faces are evenly lit.

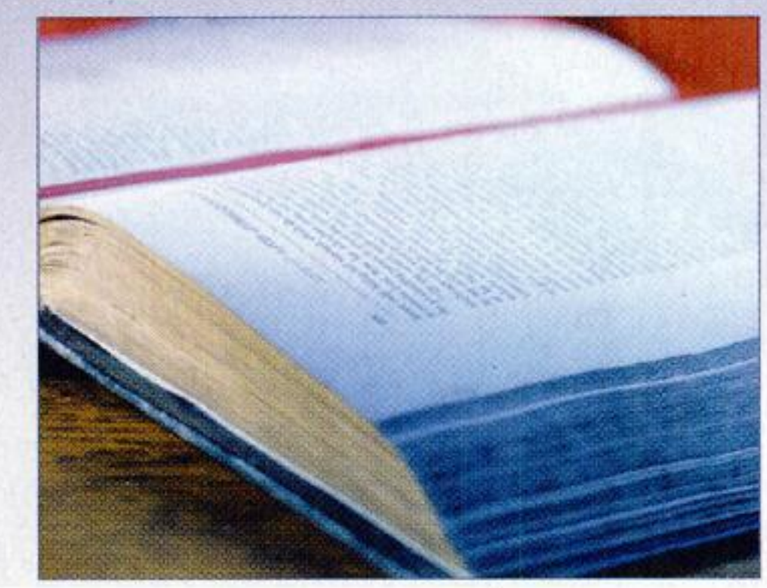
Once you have your photos, you'll use software to miniaturize the kids, add magical translucent wings to one, and finish things off with a sprinkling of sparkling fairy dust. We used Adobe *Photoshop CS*, but you can accomplish the same tricks using Adobe *Photoshop Elements* or *Paint Shop Pro*. The overall effect looks complex, but the techniques are relatively straightforward.

The secret to this project lies in attention to detail: applying the sparkles and shadows in the picture, and matching the colors and lighting of all the elements.

SHOOTING THE SEPARATE ELEMENTS

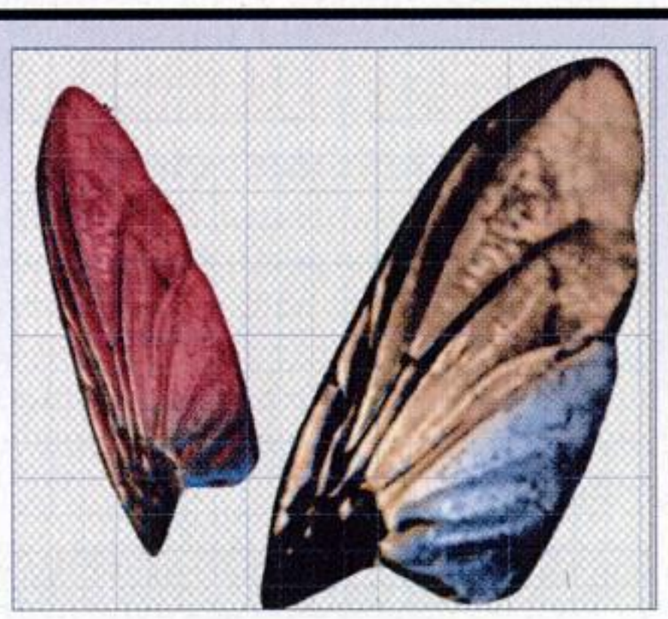
1 THE CHILDREN Shooting the kids in a studio enabled us to use lighting to enhance the image. Notice how the blue-gelled light coming in from the right contrasts with the warmer light on the left. We took more than 100 digital shots to get the exact pose we wanted.

DO IT YOURSELF You don't need to use gels to get this same lighting effect: add a cast in *Photoshop* by selecting and changing the hue, instead.



2 THE BOOK The blurry background in the book shot was achieved in-camera by combining low light with a wide-open camera aperture. We also matched the blue lighting effect from the model shot to blend the two images more convincingly.

DO IT YOURSELF Choose your children's favorite fantasy book and lay a satin ribbon down as a bookmark. Photograph it using the technique described above.



3 THE WINGS These "fairy" wings were created with 3D software. We imported them into *Photoshop* and made them transparent to give them a magical quality. The sparkles were also added in *Photoshop*.

DO IT YOURSELF Photograph a live butterfly. Import the image into *Photoshop* and cut out the wings. Make them more transparent, and add the sparkles.

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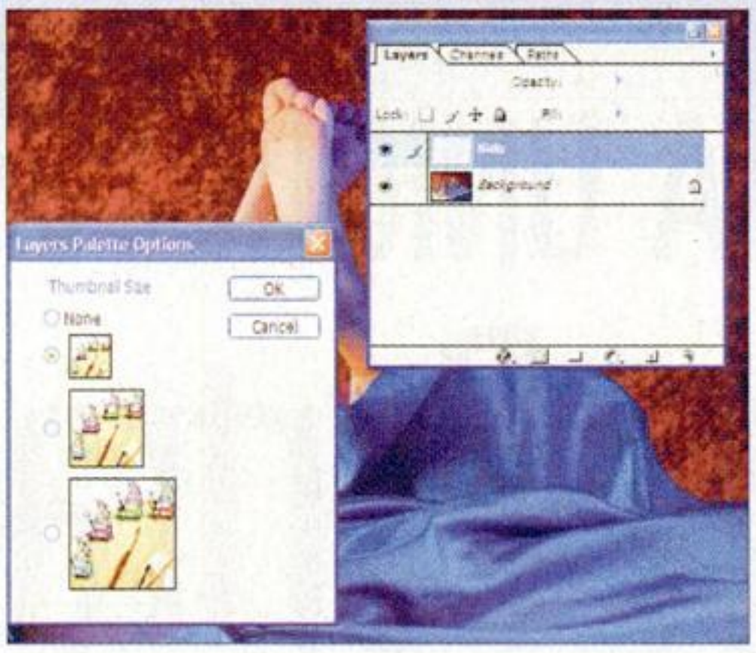
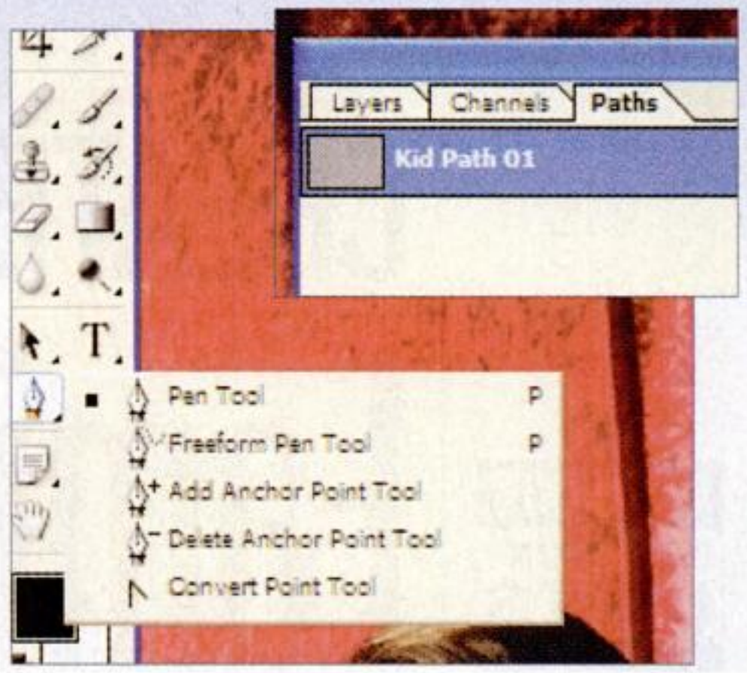
ISOLATING THE SUBJECT

The first step is to remove the kids from the unwanted studio background

1 UNLOCK THE LAYER Open the photograph in *Photoshop*. At this stage, the background layer will be locked. Double-click the layer thumbnail in the Layers palette. A New Layer window will open. Label the layer "Kids." Color the layer thumbnail blue to make it easy to identify. Click OK and you have an unlocked editable layer.



2 INCREASE THUMBNAIL SIZE Make the layer thumbnails a bit bigger. A quick way of doing this is to right-click an empty section in the Layers palette. A small pop-up window will appear with various thumbnail-size options. Alternatively, go to the icon at the top right of the palette and open the Layer Palette Options window.



3 CREATE A PATH THUMBNAIL Click the Paths tab. Click the Create New Path icon at the bottom of the palette. Label the path "Kid Path 01." Select the Pen tool from the floating toolbox. Select the path thumbnail. You are now ready to begin drawing a path around the children.

4 PLACE ANCHOR POINTS Zoom in on the boy's head. Draw your path's first anchor point. As you place your second point, hold down the mouse button and drag it to control the Bezier curve linking the two points together. Use this technique to continue drawing a path around the kids.

5 PICK UP A PATH Unlike the Lasso tool, you can stop selecting your path to do something else and then carry on. Select the Pen tool and place the cursor over the last anchor point. The tool's icon will change, indicating that it's ready to pick up the path from that point.

6 PURSUING PERFECT PATHS Continue to draw your path around the kids. If you hit Caps Lock, you'll replace the Pen tool icon with a more useful cross-hair target icon. This will make it easier to accurately place the anchor points.

ACCURATE PATHS For total accuracy, after drawing a curve, Alt-click on the last anchor point. The straight line that passes through the point, halves. Release the Alt key and continue drawing.

BEZIER CURVES *Photoshop* has an advanced set of Path-related tools in the toolbox. Paths are made up of anchor points. Each anchor point has a handle that lets you interactively adjust the Bezier curve that joins two points together. In this way you can select large curved areas with a minimum of anchor points.

COMPLEX CONTOURS When you come to more complex areas, such as the girl's flowers, you'll need to place your anchor points closer together. Continue dragging the mouse to create small curves between each point.

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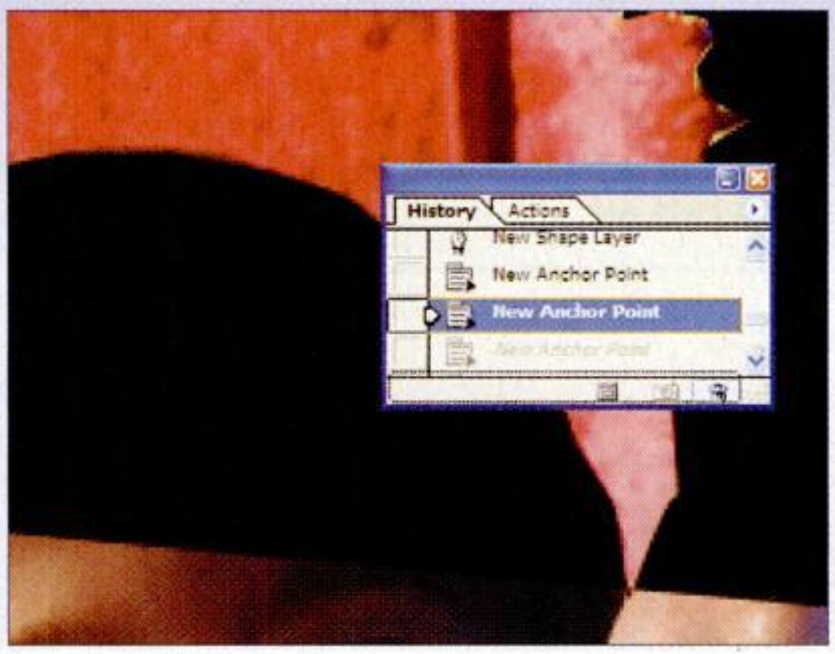
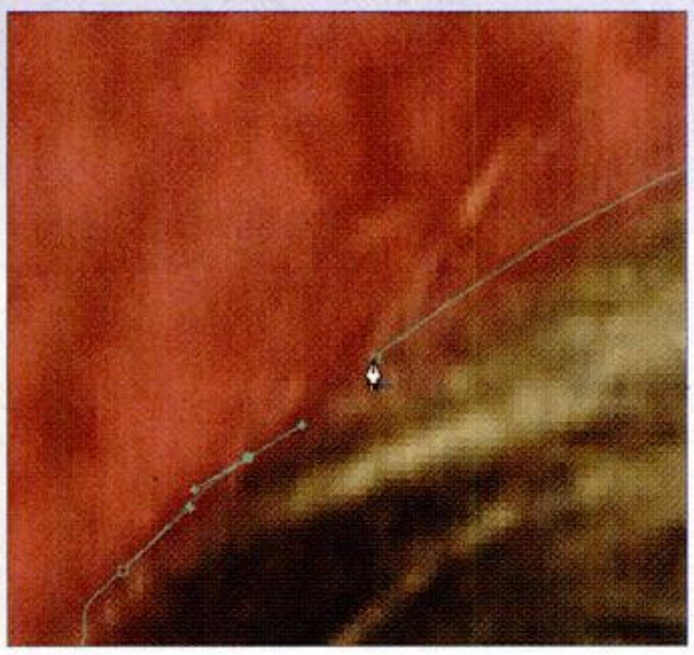
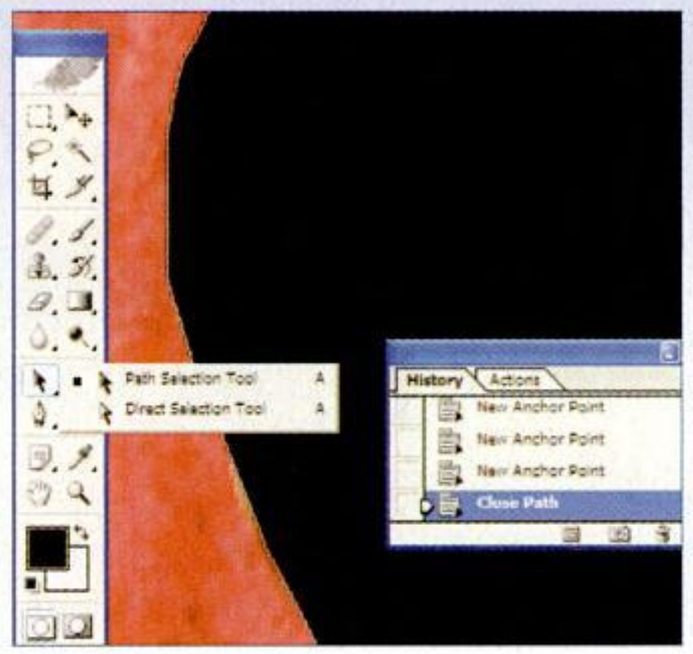


7 RETRACE YOUR STEPS You'll probably make errors as you create your path, especially when you're zoomed in so close that you can't see the forest for the trees. Open the History palette (Window, History). Drag the offending anchor points to the trash to get rid of them.

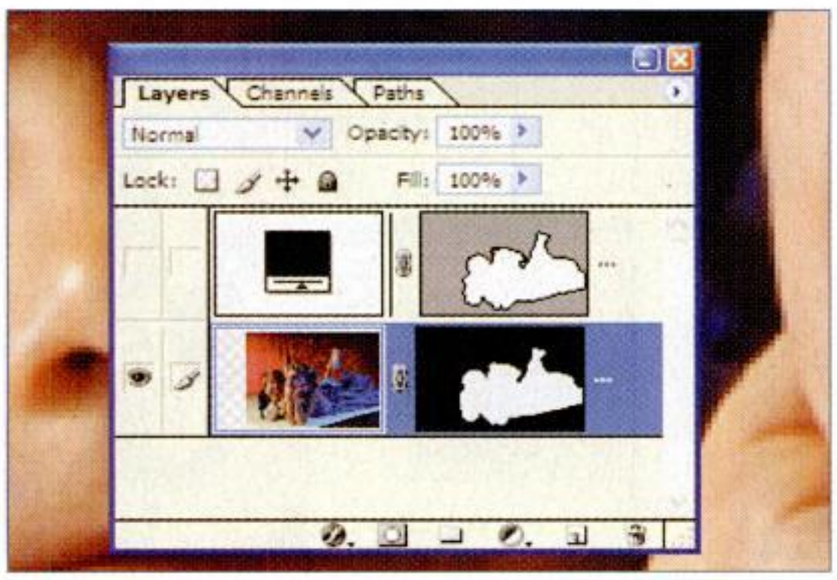


8 COMPLETE THE PATH Continue drawing the path around the outline of the children and place the last anchor point directly on top of the first. The Pen tool icon will change to indicate that it is going to close the path.



9 EDIT THE PATH You'll need to tweak parts of the path to make it more accurate. Hold down the mouse on the Path Selection tool icon to choose the Direct Selection tool. Click an anchor point and drag the control handle to edit the curve.

10 MAKE A SELECTION Select the path thumbnail. Click the palette pop-up icon and choose the Make Selection option. Set the Feather tool at 1 pixel to soften the edge of the selection. The "marching ants" will appear, indicating the selected area of the layer.



11 CREATE A LAYER PATH Go to the Layers palette and select the Kids thumbnail. Click on the Add a Mask icon at the bottom of the Layers palette. The sections of the layer outside of the path will now become invisible, so that all we can see of the scene is our models.

12 MODIFYING AN EXISTING MASK The handy thing about layer masks is that you can modify them to hide more sections of the layer whenever you like. This helps us handle any stray bits of the image that might have been missed.

ADD TO MASK With the path selected, go to the layer mask and fill the selection with black to hide whichever parts of it you want.
NEW PATH The section under the girl's crossed feet also needs to be hidden. Create a new path in the paths palette to select the section.
Layers
Channels
Paths
Normal
Opacity: 100%
Lock:
Fill: 52%

LAYER MASKS When you spray a black brush on a layer's mask, the corresponding pixels on the layer will be hidden. You can restore the layer's missing detail by spraying white onto the layer mask. Unlike the Erase tool, layer masks are nondestructive, so no information is permanently lost. This is why they are so useful.

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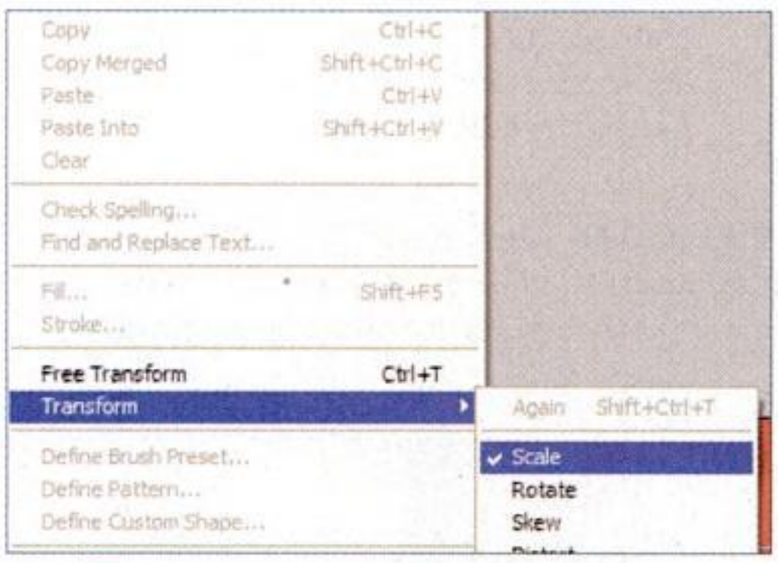
MERGING THE LAYERS

Now we can add the Kids layer to the image of the book, shrink the kids, and create realistic shadows

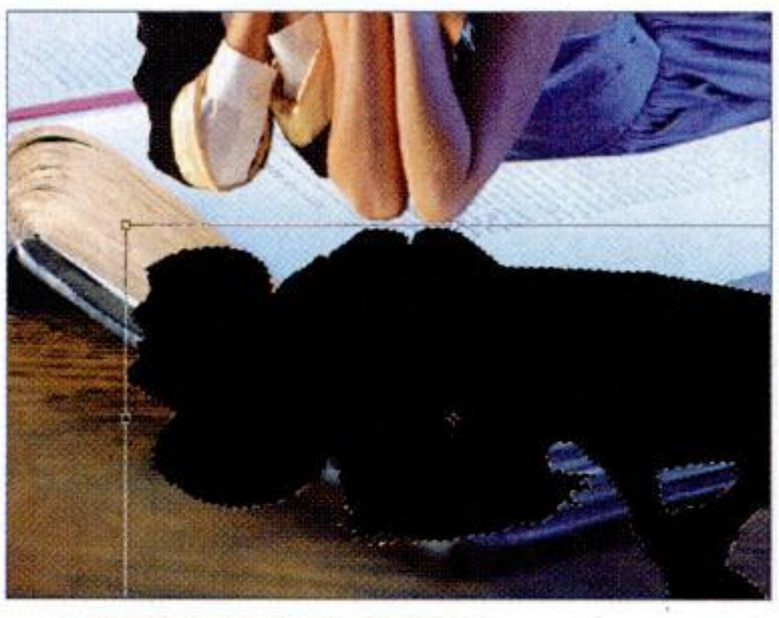
1 ADD KIDS TO BOOK Open your book photo. Select the open Kids photo you've been working on. Drag the Kids layer thumbnail on top of the open book image to add the masked children to the book file as a separate layer.



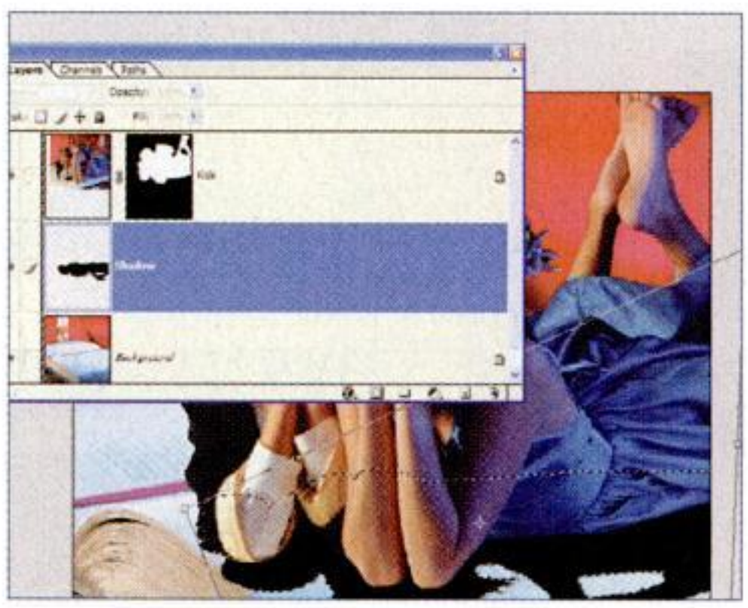
2 SCALE THE KIDS Select the Kids layer. Go to Edit, Transform, Scale. A box will appear around the children's layer. Drag the handles on the corner of the box to scale the kids down to size. Hold the Shift key to constrain the layer's shape. Use the Move tool to position the kids.

3 CREATING A SHADOW The kids need shadows to anchor them in the image. We could try copying their original shadows, but there isn't enough visual information, due to the narrow table they are lying on. We're going to have to fake it.

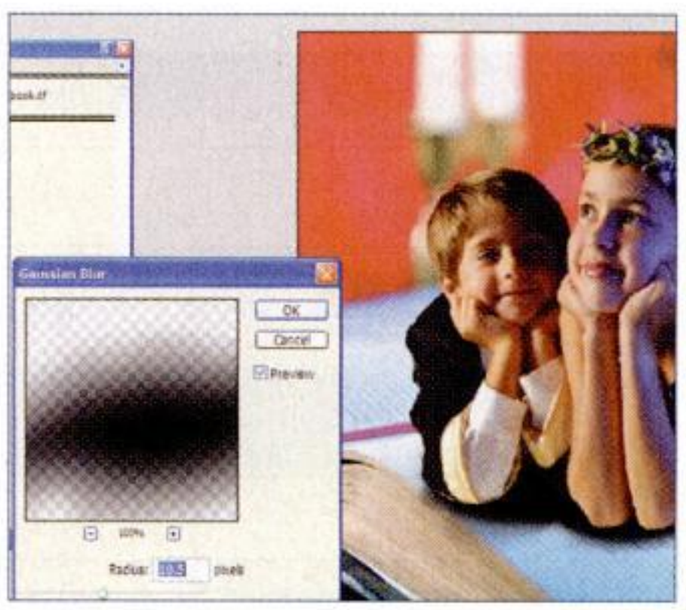
Edit Image Layer Select Filter View Window Help
Undo Load Selection Ctrl+Z
Step Backward Alt+Ctrl+Z
Copy Ctrl+C
Copy Merged Shift+Ctrl+C
Paste Ctrl+V
Paste Into Shift+Ctrl+V
Fill... Shift+F5
Stroke...
Free Transform Ctrl+T
Transform
Purge
Color Settings... Shift+Ctrl+K
Keyboard Shortcuts... Alt+Shift+Ctrl+K
Preset Manager...
Preferences
Style: Normal
Layers Channels Paths
Normal Opacity: 100%
Lock: Fill: 100%
Kids
Background
SELECT THE KIDS Right-click (or control-click) the Kids layer mask thumbnail. Choose Set Selection to Layer Mask. The "marching ants" dotted selection line will appear.
FILL THE SELECTION Now you must create a new layer. Select its thumbnail. Fill the selection with black by going to Edit, Fill, Black.



4 FREE TRANSFORM Press Command + T to invoke the Free Transform tool. A rectangular edit box will appear around the shadow. Drag the box's top middle handle down until the shadow image is upside down. Hit Return to apply the transformation.

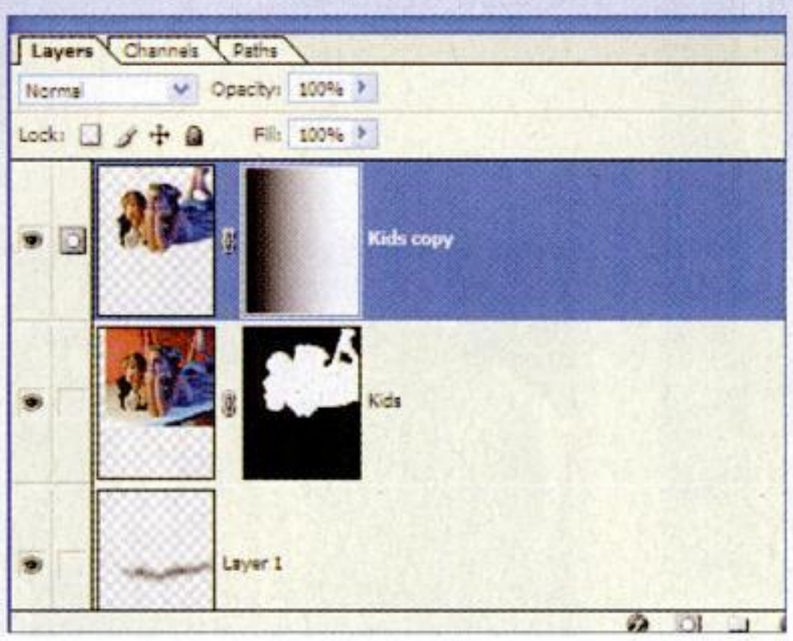


5 SHADOW SHIFTER Use the Scale, Skew, and even the Rotate Transform tools to adjust the shape of the shadow layer until it looks like the shadow in this image. Use the Layers palette to place the Shadow layer underneath the Kids layer.

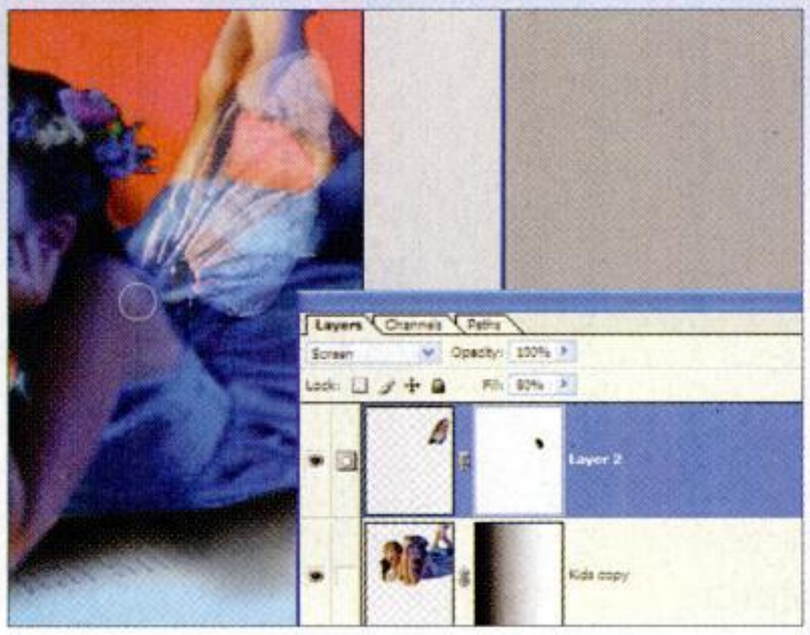


6 BLUR THE SHADOW Apply a Gaussian Blur filter to the Shadow layer. Use the Layers palette to reduce the Shadow layer's opacity to 55 percent. Add a new layer where the kids touch the book and spray a soft black airbrush.

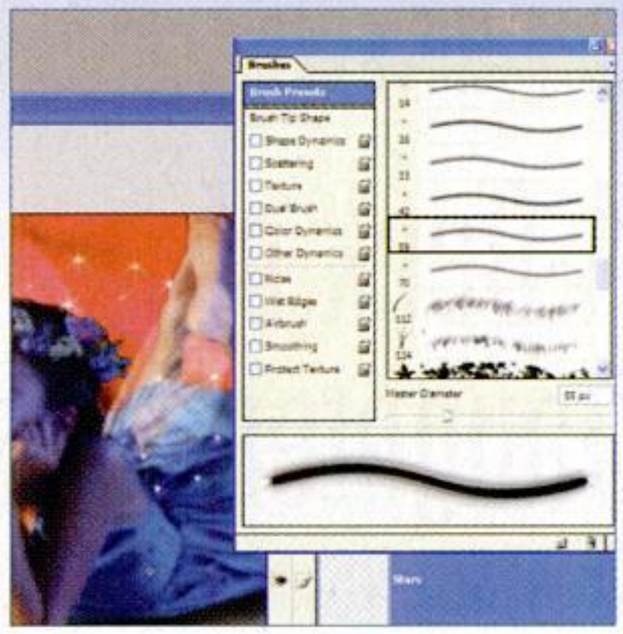
Copyrighted material



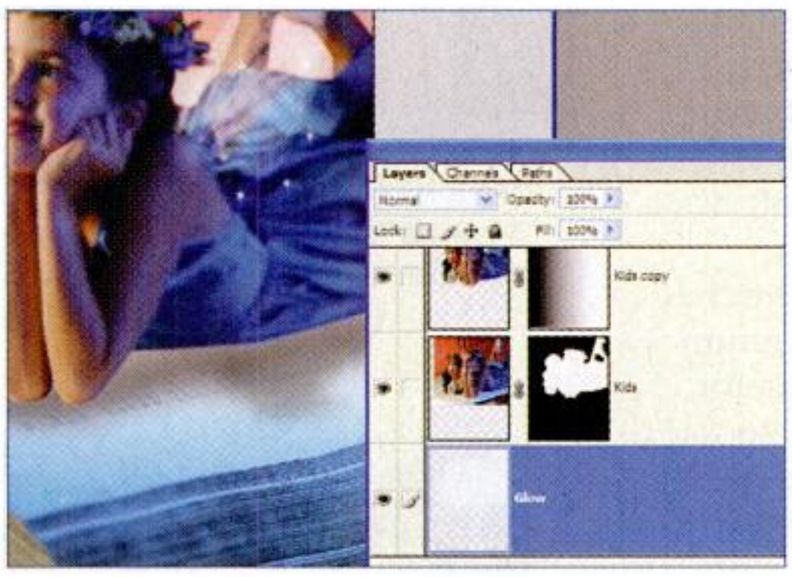
7 FAKE DEPTH OF FIELD Place a duplicated layer above the original. Gaussian Blur it and go to Layer, Remove Layer Mask, Apply. Add a new mask. Draw a horizontal black/white linear gradient on the mask, so the layer starts off in focus and blurs towards the feet.



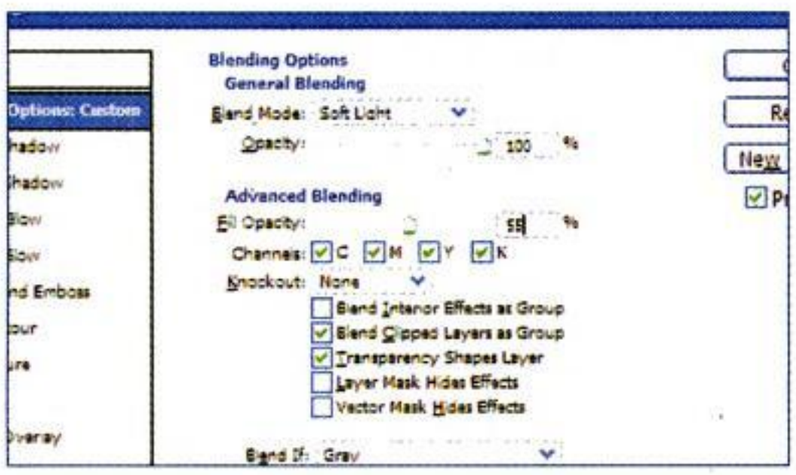
8 WING IT Copy the left wing from your wing photograph and paste it into the scene. Set the layer Blend mode to Screen. Set the layer Fill mode to 80 percent. Add a layer mask. Use a black brush to spray out the parts of the wing that should be hidden behind our fairy's shoulder.



9 FAIRY DUST Use the same technique for the right wing. To add a magical fairy sparkle to the wings, open the Brush Preset Picker and scroll down until you find the Star Brush. Use various sizes of this brush to add the stars to a new layer.

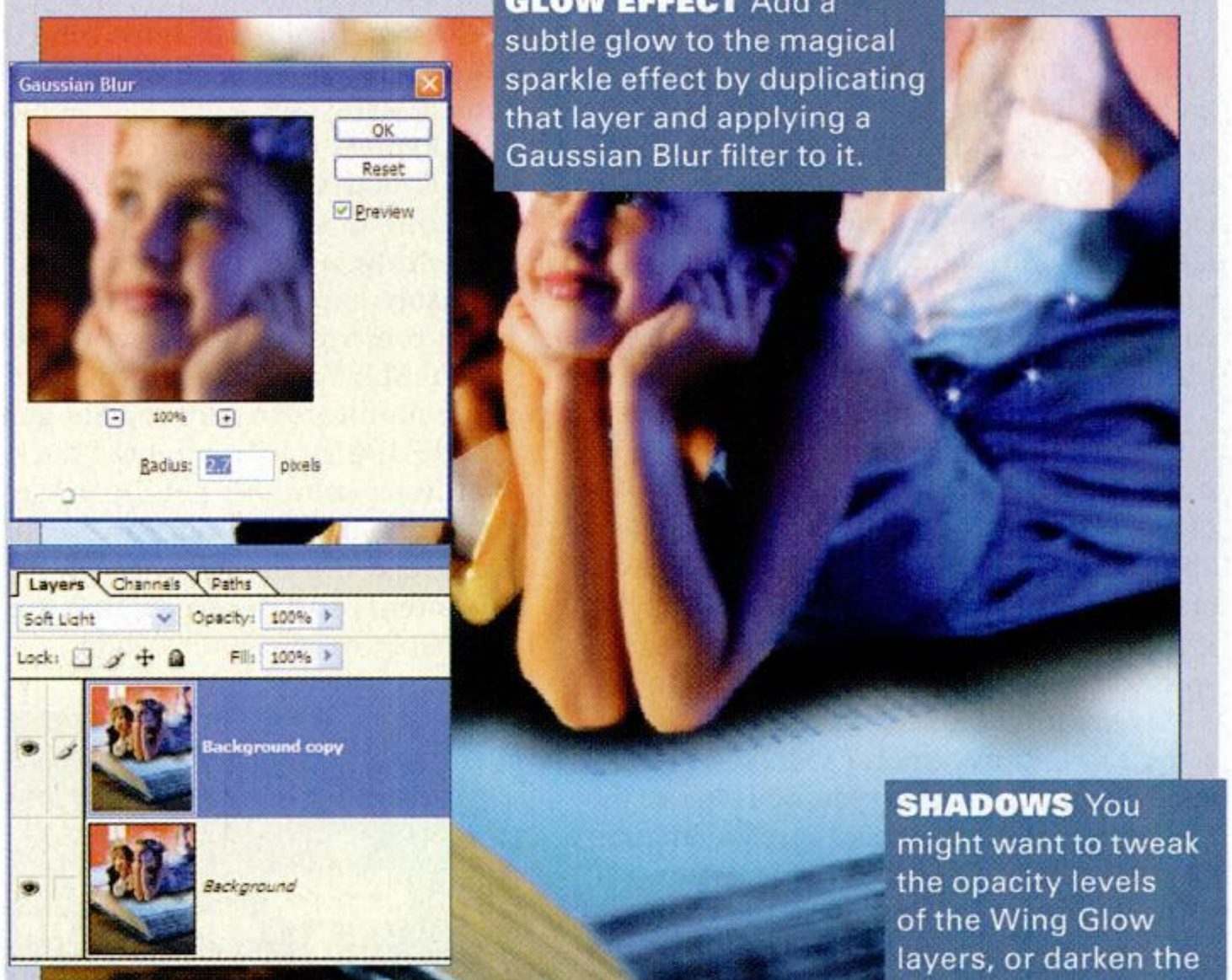


10 ADD AN EDGE GLOW Right-click the Kids layer mask. Choose Set Selection to Layer Mask. Create a new layer called "Glow." Fill the selection white. Apply a Gaussian Blur filter to the layer. Place the Glow layer under the Kids layer. Erase the glow where the children are on the book.



11 WING GLOW Use the same technique for the fairy wings. To make the wings more ephemeral, place the Wing Glow layers on top of the wings. Set the Wing Glow layer blend modes to Soft Light. Set the layer Fill modes to 55 percent.

12 ADDING MYSTICAL EFFECTS Any creative piece will need a bit of fine-tuning before you're ready to print the image. We're going to tweak the shadows, add a slight soft-focus effect (called Promist), and add a glow to the sparkles. ■



GLOW EFFECT Add a subtle glow to the magical sparkle effect by duplicating that layer and applying a Gaussian Blur filter to it.

SHADOWS You might want to tweak the opacity levels of the Wing Glow layers, or darken the shadows for added authenticity.

PROMIST EFFECT Flatten the image. Duplicate the main layer. Apply a Gaussian Blur to the copy and place it above the original image. Set the layer blend mode to Soft Light.

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In the Lab

A behind-the-scenes look at Maximum PC testing

A Deck of Daughtercards

A comparative look at SLI configurators

For consumers, the most confusing element of nVidia's SLI technology is the little daughterboard that informs the motherboard how to configure the two x16 PCI Express slots.

PCI-E lane-shifting shenanigans are necessary because today's consumer chipsets don't support more than 20 or 22 PCI Express lanes in the north bridge, falling short of the 32 lanes of a true dual x16 configuration. (Adding more lanes would necessitate a more complex physical interface between the chipset and the motherboard.)

For SLI, nVidia takes the 20 lanes in the nForce4 chipset and dedicates 16 to the graphics slot when running in single-card mode. The second x16 slot is then configured to run in either x1, x2, or x4 mode (the choice is left up to the motherboard maker). SLI actually runs best when both slots are running at the same speed; so when the daughterboard is set to SLI mode, both x16 physical slots are instructed to run at x8.

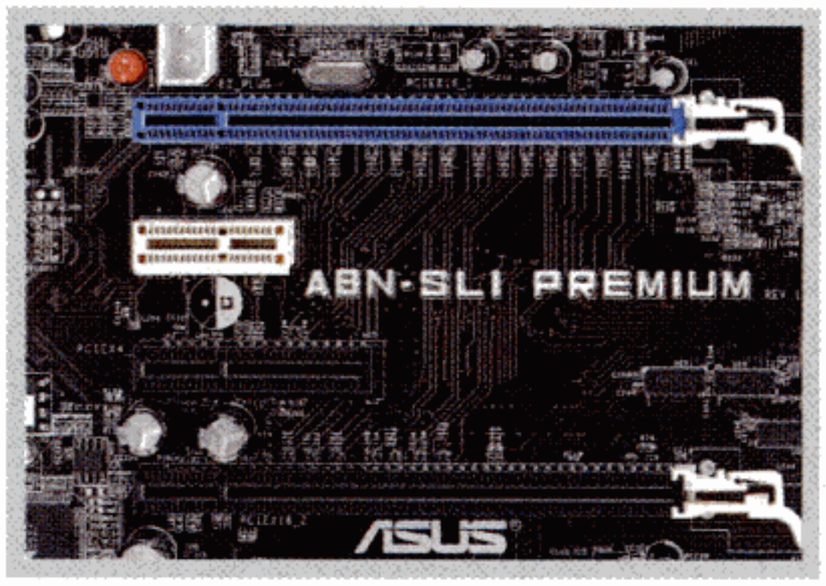
Because today's graphics cards don't even touch the 8GB/s speed that's available in x16 mode, you're probably wondering why nVidia didn't simply leave both slots in x8 mode at all times. The reason is marketing: To have a chipset that doesn't offer a x16 mode, even if it isn't used for years, would grant a huge spec-war advantage to the competition.

Several motherboard companies have sought to improve upon nVidia's SLI reference design, and we've seen no fewer than four different motherboard implementations. Of them all, MSI's K8N Neo 4 Platinum/SLI board follows nVidia's pattern the closest. Although it works just fine, the little plastic arm that holds the daughtercard in place feels weak enough to snap off.

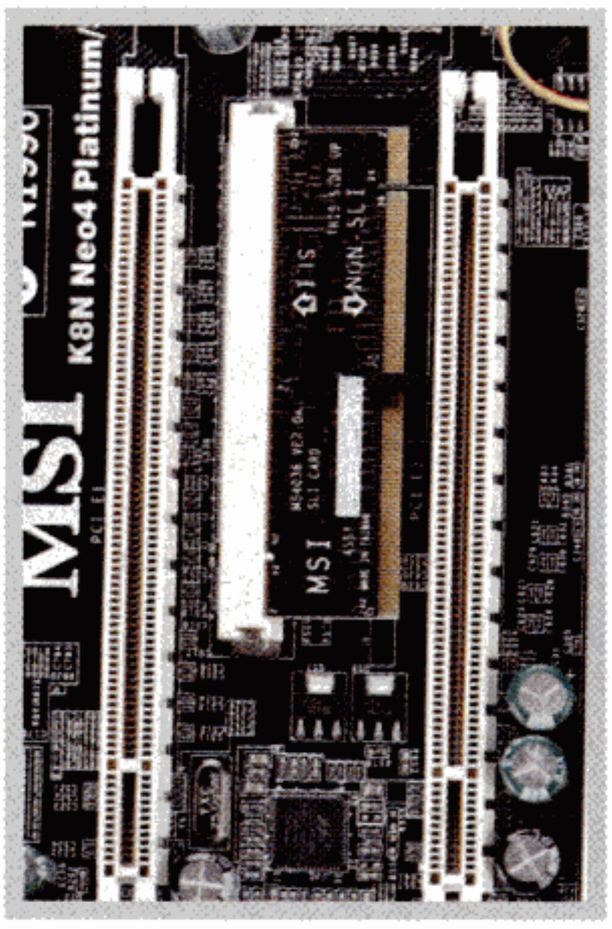
The daughtercard implementation on Asus' A8N SLI Deluxe was hooptie, as well, in its original iteration. The first card we received was affixed with a sticker that made it difficult to lock into place on the mobo. Production versions of the A8N, however, use a silk-screened label on the card, which makes it far easier to install, and once in, it seems quite stable.

DFI's solution, featured on the LAN Party nForce4 SLI-DR board, rates highest on the annoyance meter. This design uses six blocks of jumpers—as opposed to a daughtercard—all of which must be switched. Although it's scary looking, the jumper blocks really aren't that difficult to change, and we've since warmed to the design because there's no card that might shift or pop out over time.

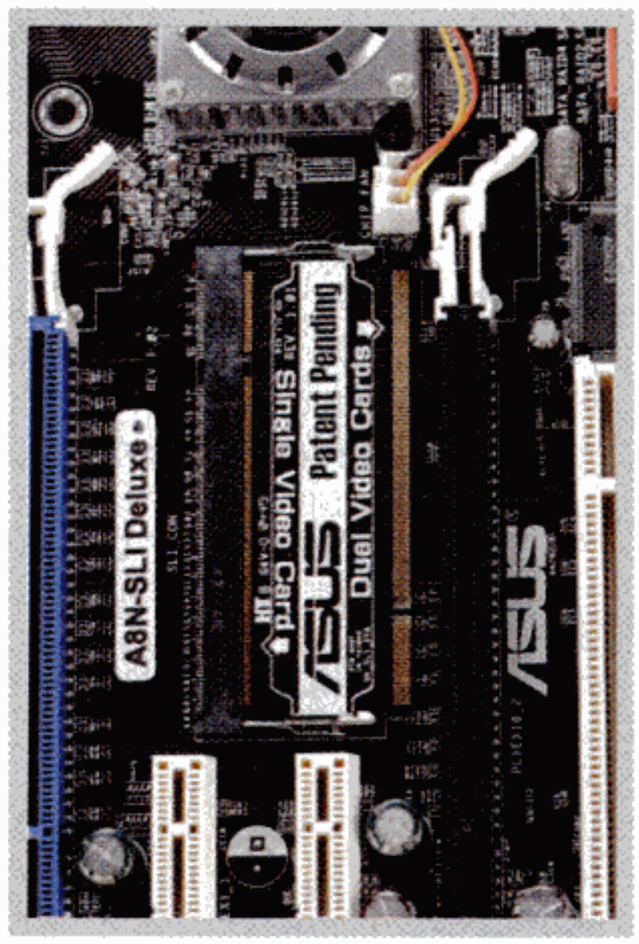
The best solution, however, could be the one found on Asus' new A8N SLI Premium board: Asus uses a Pericom Semiconductor PCI Express integrated circuit to change PCI-E modes with a mouse click. Asus hasn't released all the details yet, but if you're switching modes with your mouse, it's presumably happening from within the OS. That presents a whole new way to think about SLI: You could go from running multiple monitors to running SLI gaming on a single display with a mouse click. Existing hardware solutions require you to crack open the box, pull out the second videocard, and flip the daughterboard. And for all intents and purposes, that means you'll probably never switch modes.



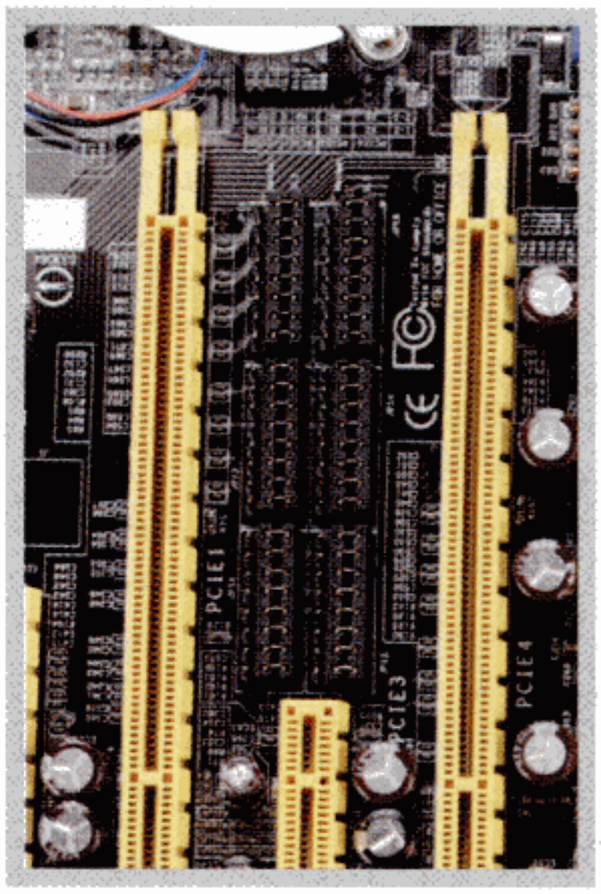
In this design, Asus eliminates the card altogether by using an IC to switch modes.



MSI's SLI daughterboard is patterned after nVidia's reference design; a small plastic arm holds the card in place.



Asus uses a connector similar to a notebook PC's SO-DIMM module; it snaps in place with two arms on the side.



As annoying as it is effective, DFI's connector requires that you switch six jumper blocks to go from SLI to single-card mode.

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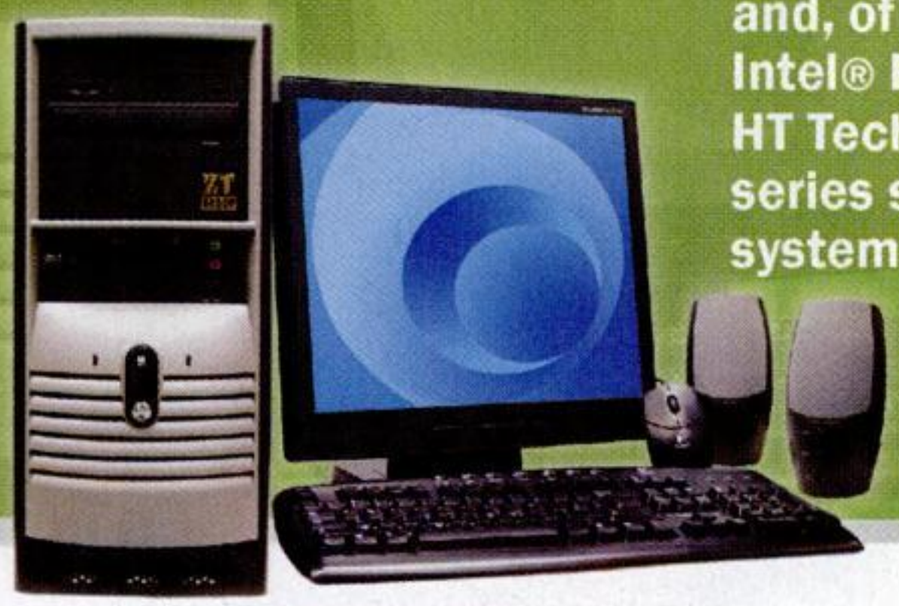
Multi-tasking. Multi-talented.



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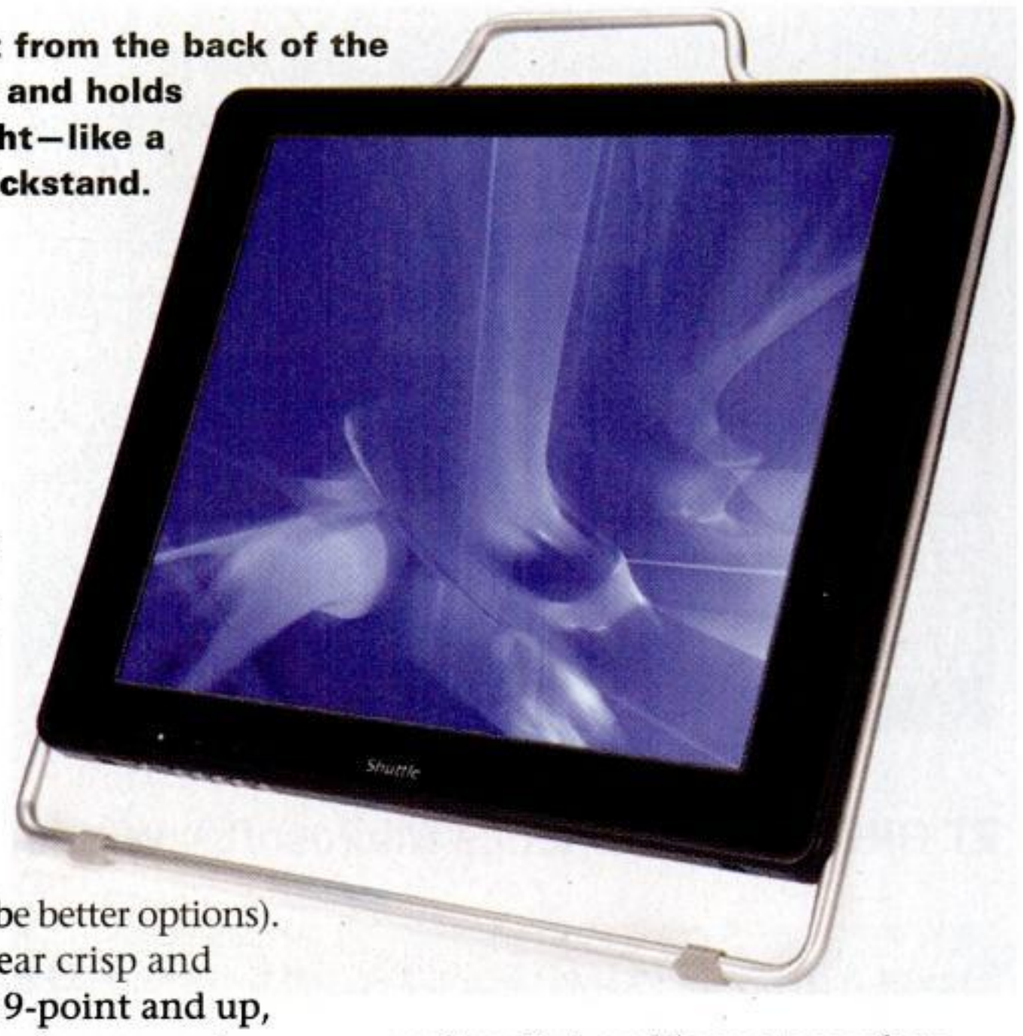

A stand pulls out from the back of the Shuttle XP17 Lite and holds the monitor upright—like a kickstand.

Portable LCD Lowdown

Taking your monitor with you has never been easier

With so much of modern life spent on the go, it makes sense for our gear to be portable. Clearly the concept has taken root in desktop PCs, as there's no shortage of compact, behandled rigs available to today's mobile masses. Now, said movers and shakers have a couple of options when it comes to portable desktop monitors.

This month we test two LCD flat panels made expressly for transport by Shuttle and Ben Q, respectively. Their specs are identical, but their personalities are not.

—KATHERINE STEVENSON

Shuttle XP17 Lite

Shuttle is a pioneer of small form-factor boxes and the brand remains a favorite of LAN party enthusiasts, so the XP17 Lite is an obvious companion piece to the wee gaming PCs. Like those machines, the XP17 Lite LCD sports a sleek, stylish, high-tech aesthetic. The 17-inch screen is encased in a glassy, acrylic pane, so the unit's face is totally slick and seamless. But there's a downside to all the gloss. The shiny exterior is distractingly reflective.

In transit, the BenQ FP785 is carried upside down, with the base folded in on itself to create handles.

This was immediately apparent when we fired up *DisplayMate's* (**www.displaymate.com**) Dark Screen, which is meant to evaluate an LCD's black levels. Far from black, the screen held mirror images of our lovely mugs and our Lab surroundings. And in *DM's* gray-scale screens, we had trouble discerning the dark grays from true black unless we viewed the screen off axis. (After receiving our review unit, Shuttle released Temp AG and Temp AR versions of the monitor, which feature tempered anti-glare and anti-reflective screens, respectively, and might be better options).

Serif fonts appear crisp and clearly legible at 9-point and up, and the XP17's performance in *Need for Speed: Underground*—our fast-motion game test—was perfectly acceptable, even with the resolution interpolated to 800x600.

As for transportability, the XP17's handle is sturdy and comfortable enough, and it's light by even LCD standards, but sorely lacking is any kind of protective carrying case. Shuttle offers one as an aftermarket accessory, but we think it should come bundled with any monitor meant for travel.

Shuttle XP17 Lite

MAXIMUM PC VERDICT 9

+ PERSONALIZED LUGGAGE

Slick aesthetic, super bright screen, and made to travel.

– PERSONAL BAGGAGE

Reflection issues, no protective cover.

$390, www.shuttle.com

BenQ FP785

Maybe it's the rounded edges and the burgundy trim, or the fact that the FP785 debuted at Milan's fashion week, but we have a hunch LAN partiers aren't the FP785's target audience. Indeed, the unit is designed to look like a handbag when carried. Elegantly, the handles also serve as the monitor's base. The screen can be tilted slightly forward or back on its stand.

In *DisplayMate* tests, the FP785 initially came across as a champ. In the first several screens, we were loathe to detect flaws, and next to the Shuttle XP17, the FP785's superb visibility was a testament to the wonders of anti-glare and -reflective coating. But problems arose when the FP785 was tasked with reproducing gray scales consisting of more than 65 steps of gradation. In the various 128- to 256-step scales, striations peppered what should have been a smooth transition of shades from black to white. This indicates a limited number of intensity levels at the extreme ends of the scale, something that might result in artifacting when displaying content with a lot of very dark or light elements.

Serif-font legibility was good, but not great, for 9-point and larger text. There was faint evidence of red, green, and blue in the edges of some of the characters, probably due to slight variations in the black levels of the primary color channels.

Need for Speed: Underground ran without any glaring visual artifacts—in native and nonnative resolutions—but fast-motion sequences were slightly more blurry than on Shuttle's monitor.

The FP785's tote-ability was on par with Shuttle's XP17, although it's more than a pound heavier. Both models are comparatively slim and lightweight, but the load is not totally insignificant, especially when you factor in these monitors' external power bricks. Like the XP17 Lite, BenQ's portable is sold sans carrying case.

BenQ FP785

MAXIMUM PC VERDICT 8

+ TRAVELING LIGHT

Easy to transport; decent performance.

– MISSING YOUR FLIGHT

Limited gray-scale range; no protective cover; pricey.

$600, www.benq.com

Specs	Shuttle XP17	BenQ FP785
Viewable screen	17 inches	17 inches
Native resolution	1280x1024	1280x1024
Pixel pitch	0.264mm	0.264mm
Interface	DVI, VGA	DVI, VGA
Carry weight	12.10 lbs	13.80 lbs

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OptiSlim M12 Portable Scanner

Scan on the run

Nostradamus predicted the paperless office would be commonplace by the 21st century, yet we're still up to our necks in dead-tree pulp. But if Plustek just put a little work into a few important features, its OptiSlim M12 portable scanner could help fulfill the sage's prophecy.

Less than a foot long, the OptiSlim boasts heartwarming specs for a device its size: 600dpi optical resolution, 48-bit color depth, and a scan rate of up to three pages per minute, depending on resolution. A motorized mechanism feeds the paper through the assembly (it can handle items as small as a gum wrapper and as large as a letter-size document), and the whole enchilada is USB powered.

Still, our first grapple with the OptiSlim was not a cheerful affair. Even simple business cards, with minimal color and clearly legible sans-serif fonts, were reduced to cuneiform by the OptiSlim's optical character recognition (OCR). The descreen setting (for eliminating the halftone patterns endemic to magazine page scans) wasn't tweakable and was only somewhat effective. Photographs didn't fare well either—add horn rims and a beehive to the image and you'd swear you were looking at faded snapshots from the 1960s.

But the OptiSlim was spared ridicule and cruel nicknames thanks to its performance scanning documents in text mode to be processed by the OCR engine. It breezed through a lightly formatted page containing 12-point Times New Roman text without a single boo-boo (although there were minor formatting glitches at the end of the document). It delivered similar performance with a ridiculously complex credit-card statement, scanning and transcribing it with nearly all the formatting intact and just a single OCR error (thoughtfully highlighted in green to label it as suspect).

Erin Brockovich could have used a gadget like Plustek's OptiSlim M12 portable scanner.

Don't let the modest 7 verdict give you the wrong idea: The OptiSlim is distinguished in our eyes; it's a much handier travel scanner than those awful fountain pen-size scanners that convert text into something resembling graffiti tags. Despite its quirks and limitations (including a suite of competent, but poorly integrated apps), it manages the most essential functions that business travelers and corporate spies require: better-than-average OCR and acceptable scans of visual media for later reference. Many a salaryman will be grateful.

—LOGAN DECKER

MAXIMUM PC VERDICT 7

+ LUGGAGE SCAN

Fine OCR; petite; good software bundle and price.

– STRIP SEARCH

Horrible photograph/business card scans, no integrated memory for stand-alone use, and USB 1.1.

$130, www.plustek.com

Acoustica Beatcraft

The next best thing to a set of drums

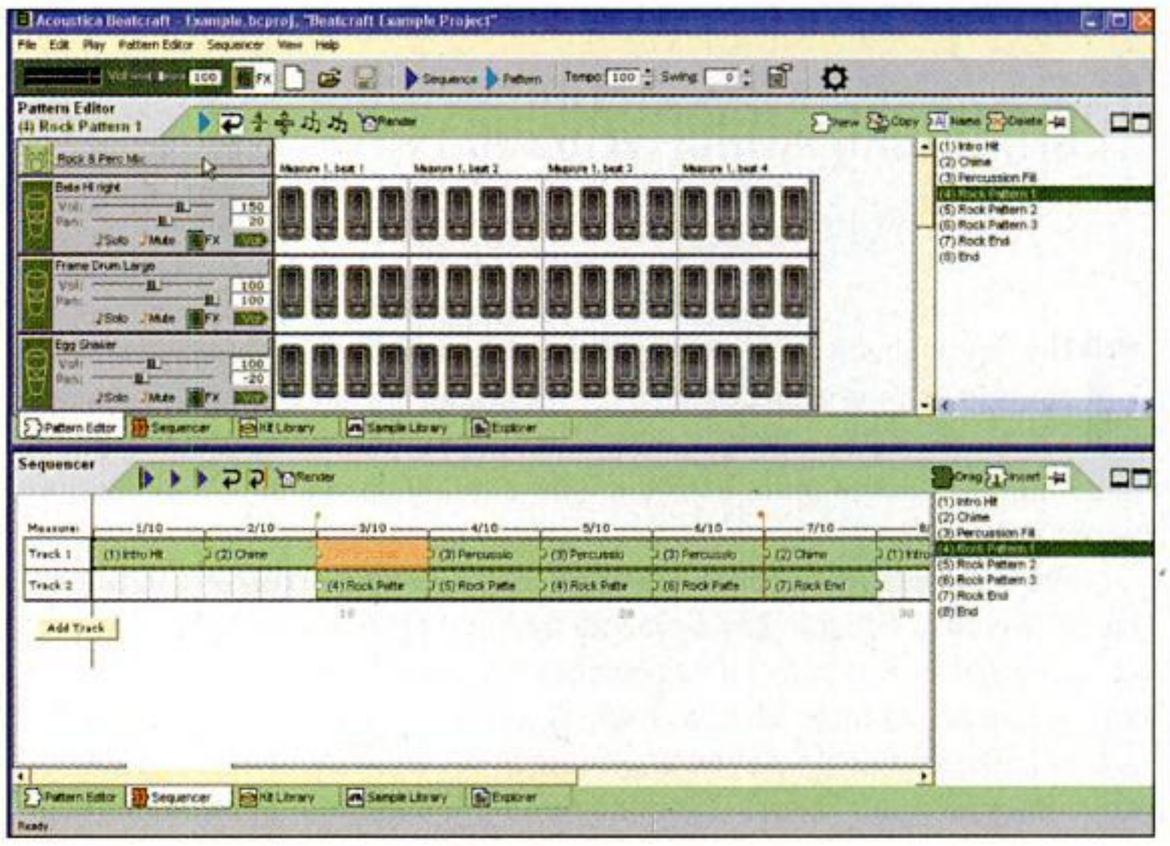
The first drum machine I ever bought, a Yamaha RX-11, set me back a cool $1,500. So I was understandably skeptical when I heard Acoustica's promise that *Beatcraft* would turn my PC into a drum machine for less than 50 bucks. After spending several hours with the program, though, I must admit that I'm impressed.

The program gives you the option of building rhythm tracks based on predefined drum kits, or you can create your own tracks using the provided samples and loops. The drum sounds seemed excellent to this drummer's ear, and there's plenty of variety to fit just about any musical style. If you run out of sounds, Acoustica sells two expansion packs: *More Drums, Volume 1* ($15) and *More Drums, Analogania* ($20).

Creating a rhythm track consists of three basic steps: Assemble your drum kit from the in-depth library of drum sounds (all manner of bass drums, snares, toms, hi-hats, and crash cymbals; plus a full set of percussion instruments), create a series of rhythm patterns, and then assemble the patterns into a full-fledged song. Everything is accomplished either by pointing and clicking or by clicking and dragging.

Patterns are created in the Pattern Editor window, in which each drum is placed on its own track. Tracks are subdivided into measures and beats, and you trigger each drum by setting its volume on a particular beat. In addition to volume—indicating how "hard" the instrument is struck—you can also apply audio effects, such as left-right stereo panning and reverb, to meticulously sculpt your overall sound.

Once you've created your patterns, you move down to the Sequencer window to assemble them into a song: Simply drag the patterns from the Pattern Editor into the Sequencer. The final step renders the sequence into an audio file in WAV, MP3, WMA, or OGG format. You can even tag the file with copyright information (the name of the sequence, the date it was created, your name as artist, and comments).



You can easily create complex rhythm tracks using *Beatcraft's* intuitive user interface.

The entire process is highly intuitive; you definitely don't have to be a musician to enjoy creating music with this program. I wouldn't hesitate to use it to create rhythm tracks for song demos or for a guitarist or keyboard player to jam with.

—JOHN WIND

MAXIMUM PC VERDICT 8

+ GENE KRUPA

Intuitive user interface, excellent drum samples, well priced.

– THE CROUP

No MIDI support.

$50, www.acoustica.com

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Asus Vento 3600 Gaming Case

Looks aren't everything

The Vento has the body of a Ferrari Enzo, but the bone structure of a Geo Metro.

The Vento 3600's lusty red paint and bulging scoops are sexy enough to instill fantasies of taking it home and making mini-ATXs with it. Peel away that luscious exterior, however, and you'll discover a clunky, no-frills, steel enclosure. It's like scoring a date with a model who could only pose for *Dog Fancy*.

The exterior fairings that look so glossy and mouth-watering in pictures are, in reality, totally hooptie and serve no real purpose. The review unit we received (which arrived in a retail box) sported two different shades of red paint, as though the front of the unit cured differently than the rest of it. The flip-up door covering the internal 5.25-inch drive bays—Asus calls it the Magic Mask—is good only for laughs. When activated, it flips up and slams against a set of flimsy plastic restraints—and then has to be slammed shut, repeatedly.

Twist the handle on the side to open the Vento, and you're greeted with a generic, steel cage, which is what you'd expect to see inside a $40 case; the Vento, however, sells for $150. The cramped interior supports both ATX and micro-ATX motherboards, and the 5.25-inch bays and the PCI slots both offer a tool-less fastening mechanism; regular screws are required when installing a hard drive into one of the three internal 3.25-inch bays. There's an 80mm intake fan inside the left-hand air scoop that inexplicably points to the right-side air scoop: It's not only ineffective at drawing fresh air into the case, but it's too far away from the drive cage to cool anything.

To its credit, the Vento includes a useful 12cm exhaust fan, an air duct over the CPU area, and front-mounted USB ports. And apart from the unintentional two-tone paint job, it does look kinda cool. For about five minutes. But the capper is that you'll find the same interior features on cases that cost less than a third of what Asus expects for the Vento.

—JOSH NOREM

MAXIMUM PC VERDICT 4

MENTOS

Shiny, and looks cool.

VENTOS

Steel construction, lacks features and cooling, and feels cheap (the front door broke on the first try).

$150, www.asus.com

Thermaltake Armor VA8000SWA

MAXIMUM PC KICK ASS PRODUCT

This lightweight case is heavy on features

We like this case so much, we've been referring to it as the *Amour*.

The Thermaltake Armor is one of the most modular and customizable enclosures we've laid retinas on. It's like an aluminum sandbox inside of which you can build a wide variety of PC configurations. But one of its most attractive features is the way it can accommodate either air or water cooling.

The case has no fewer than 10 tool-less 5.25-inch drive bays in front, one of which is occupied by a module harboring the power button and indicator lights. But you can easily move this module to any other open bay. A removable three-slot hard-drive cage with a built-in 12cm fan and a blue LED can also be placed anywhere in the front bezel. Not enough drive bays for you? There's a second three-drive cage, with its own 9cm exhaust fan, near the top of the case. This one lies next to the vertically mounted power supply.

Now you're probably thinking, "There's a drive cage *and* a PSU mounted in the top of the case? How wide is this thing?" At 220mm (8.66 inches), it's a little wider than average, but that's because it's designed to accommodate water-cooling kits like the one's reviewed in this issue (page 48). These kits require space for the coolant reservoir, a big-ass radiator, and a pump. The Armor includes extra space all around for these items—it even sports pre-drilled holes in its rear bezel, so you can route water-cooling tubing.

The Armor's all-aluminum construction renders it incredibly light, even when it's packed full of hardware—one editor went so far as to compare it to an empty beer can. But we think the aluminum is just a bit *too* thin in some areas. For example, wiggling an installed AGP card flexes the entire rear panel of the case. Not good.

Aside from the Armor's "thin is in" physique, we couldn't find a single other feature to criticize. This case has every feature we desire, and some we'll start looking for in other case designs, including its built-in tool holder and the fact that it's BTX-ready with a simple upgrade kit.

—JOSH NOREM

MAXIMUM PC VERDICT 9

FULL BEER CAN

Tons of cool features, tool-less, ready for water cooling.

EMPTY BEER CAN

Too-thin aluminum exterior makes it a bit wobbly.

$190 ($25 for BTX kit), www.thermaltake.com

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BenQ LightScribe DVD ReWriter

Burn, flip, burn. Hip!

Lab-tested, Mr. Pickles'-approved: BenQ's LightScribe DVD burner treats both sides of your discs right.

The death certificate for Yamaha's ill-fated Disc T@2 technology, which let you burn text or images onto the recordable side of an optical disc, attributed its demise to two factors: the shame of its absurd moniker, and the fact that the process consumed recordable space. But the worthy idea lives on in BenQ's DVD ReWriter.

Using superior technology—dubbed LightScribe—licensed from HP, the ReWriter modulates the strength of the burning laser to etch a gray-scale image onto a special dye coating on the label side of the disc (you must, however, use special LightScribe discs, which at press time were running about 80 cents apiece for 52x CD-Rs, and 8x single-layer DVD media for about a dollar more than that).

Burning a complex image at maximum quality consumed a little more than 40 minutes; that's a long time, but check out Mr. Pickles on our disc to the right! You can even see his whiskers, and 10-point italicized white type came out easily legible. Simple projects go much faster. We put in a mix CD that we burned ourselves, and the LightScribe software that's integrated in the bundled *Nero Express* pulled the track listing from the CD-Text embedded on the disc and burned the titles in 3:15 (min:sec).

The drive isn't just about LightScribe, though. BenQ set a record burning 4.25GB to a 16x single-layer recordable DVD+R with a time of 5:41. That's breathtaking; however, burning to double-layer media was less impressive. BenQ doesn't support "overspeeding," or burning to media at faster than the rated speed, so its double-layer performance came in at 44:09, which is about 18 minutes slower than Plextor's PX-716A.

In addition to the bundled *Nero Express*, BenQ busts out a home-brew application for power-users, called *QSuite*. This program enables you to set the default "book type" of your recordable DVD media to increase compatibility with set-top players, and it will even test your media for quality.

It's tragic that the DVD ReWriter doesn't permit overspeeding—that's a serious omission. But you can table the labels and leave the Sharpies to the harpies—the LightScribe technology is a tremendous success.

—LOGAN DECKER

MAXIMUM PC VERDICT 8

+ ETCHING

LightScribe results are almost as good as silk-screening; fast DVD+R burns.

– RETCHING

Doesn't support disc overspeeding; double-layer burn speeds are way below par.

$120, www.benq.com

Ultrasone Proline 750

Nothing comes between me and my audio

The folding design, detachable cord, and handy travel bag make it easy to take the Proline 750 headphones on the road.

If you're an audio purist—the type of aficionado who doesn't want any component in the audio chain to color what the artist recorded—whether it be a Miles Davis riff or the eerie moan of a *Half-Life 2* strider as it crumples to the ground—then you should be listening to Ultrasone's Proline 750 headphones.

These headphones deliver more than just ultra-clear, ultra-crisp audio. The unique design of the headphones themselves delivers a pseudo surround-sound effect without relying on a digital signal processor or any other electronic trickery to manipulate the audio signal.

If you look at the transducer (the device that converts an audio signal's voltage into acoustic pressure, or audible sound) inside most headphones, you'll see it's located directly in the center of the ear cup. This creates a strong stereo image inside your head, with the left and right channels sharply delineated. This is all well and good, but it doesn't deliver realistic sound because the audio events—whether they be musical notes or sound effects—are firmly positioned as originating from polar opposite sides of your head.

The transducers inside the Proline 750s are offset, so instead of the audio signals traveling directly down your auditory canal, they bounce and reflect off each of your ears' pinnae (the folds that make up your outer ear). This naturally delays some of the frequencies from reaching your ear drum, thus more closely duplicating the way you hear sound *without* headphones. It's almost as though the headphones were custom-made for your ears. As a result, your brain perceives the sound as originating from all around your head.

Listening to the soundtracks in familiar games and music with the Proline 750 set revealed audio elements we'd never noticed before. Listening to the piano version of Sarah MacLachlan's "Possession" (from *Fumbling Towards Ecstasy*), for instance, we could actually hear the piano's sustain pedal moving up and down. This left us wondering if during the mastering process, the engineers had said "Ah, don't worry about it. They'll never pick up on that."

The absence of a boom mic renders the Proline 750s unsuitable for games that support team chat. And since these are purely stereo headphones, you won't reap all the benefits from game and movie soundtracks recorded in surround sound. But we highly recommend them for any other application.

The only reason we're not bestowing a Kick Ass award on these otherwise excellent headphones is because they're not ideal for gaming. They're extremely accurate as reference monitors, but as such, they don't produce the booming bass you'd want for games.

—MICHAEL BROWN

MAXIMUM PC VERDICT 9

+ PINNA

Unique design makes them sound as if they were custom-designed for your ears.

– PIÑATA

No boom mic, expensive.

$400, www.ultrasoneusa.com

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Digital Decadence

A snapshot of the compact digital-camera scene

Fuji's E550 offers a ton of features and excellent picture quality at a reasonable price.

Point-and-shoot digital cameras are multiplying faster than rabbits in a lunchbox. And the trends and technology shifts are about as hard to track as Bugs' family tree. It can be a daunting task indeed to try to pick out the right camera for you.

And like rabbits looking for a mate, you needn't run yourself ragged looking for *the one*, there are probably several cameras out there that will meet your needs. We're here to narrow the field of potential suitors.

Here are three of the latest midrange point-and-shoot digital cameras in the 5- to 6-megapixel range. Taken together, they provide a very accurate snapshot of the industry's state of the art.

—STEVE KLETT

Epson L-500V

Prior to the introduction of the L-500V, Epson's last digital-camera play occurred way back in 2001. We're glad the self-imposed hiatus is over.

Epson's 500V sports one of the largest, sharpest LCDs you'll find in a camera this size.

The L-500V's 5MP image sensor and 3x optical zoom capabilities are standard fare, but we find this little bugger remarkable for a number of other reasons. For starters, its compact, all-metal body is unique, comfortable, and rugged. It houses one of the largest LCDs you'll find in a camera this size (the screen is just a little bigger than a pack of cigarettes).

The 2.5-inch LCD incorporates Epson's Photo Fine technology, which first appeared in Epson's line of photo viewers. Essentially, Photo Fine gives the LCD a higher pixel-density than most competing displays. You also get three colors per pixel, compared with one color per pixel on most other displays. The result is crisp, colorful images with smoother gradations and fewer "jaggies."

Epson's stated goal is for the pictures you see on the LCD to match what you see on your computer monitor. Unfortunately, we found that the images on the 500V consistently looked *better* than they did on our PC—colors displayed on the PC were often more muted. But this discrepancy can be easily fixed with editing software.

The 500V's LCD is awesome—and it needs to be. Because there's no other viewfinder, you're 100-percent dependent on the screen for composing and shooting pictures. And this works fine until you're looking at the LCD in direct sunlight. Other downers include a laughable 16MB SD memory card (we recommend at least 256MB); the menu interface makes it tough to change resolutions quickly; and outdoor shots were often overexposed. Overall, image quality was not quite as good as with Fujifilm's E550.

But these are forgivable sins, particularly when you consider the L-500V's ability to continuously shoot up to three pictures per second (at the highest resolution, 2560x1920) until the SD memory card is full. We've yet to find a camera with a better burst mode at this price point.

A generous selection of automatic program modes and manual control options, and a Print Image Framer feature that lets you smack a digital frame onto your pics for direct-printing, round out the 500V's solid resume.

EPSON L-500V

MAXIMUM PC VERDICT 8

+ MEGA-RIFFIC

Excellent burst mode and LCD display; simple to use; stylish, intuitive design.

– MEGA-IFFIC

Pics tend to look better on-camera than onscreen. No optical viewfinder.

$350, www.epson.com

Fujifilm FinePix E550

This camera might look Plain Jane, but it's really Clark Kent. Beneath its unassuming exterior lie a bevy of options that make the E550 an ideal choice for the intermediate-to-advanced shutterbug.

The E550 uses Fuji's fourth-generation Super CCD image sensor, which has a native resolution of 6.3MP (2848x2136). This renders the camera capable of making prints as large as 11x14 inches. The "Super" comes from Fuji's proprietary in-camera interpolation function, which effectively increases the megapixel count to a whopping 12.3 (4048x3040). In-camera interpolation results in less image noise at higher ISO settings and in less-than-ideal lighting situations.

Unfortunately, you're forced to shoot at the storage-consuming 12.3 Fine setting (interpolated raw-image mode) to get the camera's highest-quality images—at an XD storage-consumption

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rate of 13MB per shot! Normal and Fine settings for the 12.3MP image size are offered, but Normal's the only choice for all other sizes and resolutions. This really isn't a huge deal, because image quality is still superb at the Normal 6MP setting. Still, considering the generous amount of control you have over the camera's other features, this rigidity is a notable aberration.

Programmed auto, shutter-priority, aperture-priority, and manual-exposure modes are available at the turn of a dial, as are manual, multi-weighted, spot, and center-weighted focus options. (Limited burst-mode options are included as well.) The bright, sharp, and colorful 2-inch LCD also lets you shift the area of focus manually, or you can select continuous auto-focus to track a moving subject. The E550 is the only one of the three cameras here to offer an 800 ISO setting (in addition to 100, 200, and 400).

The E550 is also the only camera here to come with rechargeable AA batteries—carry a spare set of regular AAs and you'll avoid being left high and dry if you lose power in the field. The trade-off is a body that's the bulkiest of the group—you won't be cramming this camera in your jeans pocket. We also didn't like the awkward flush-mounted controls and the twitchy zoom. And, like the Fujifilm S5100 we reviewed in March, the E550 uses only XD memory cards.

The E550 offers one of the strongest bang-for-the-buck ratios we've seen.

FUJIFILM FINEPIX E550

MAXIMUM PC VERDICT 9

+ FAT TIRE ALE

Lots of advanced and manual control options; good digital zoom; excellent image quality.

– BUDWEISER

Can only select image quality at highest resolution; bulky design.

$350, www.fujifilm.com

Sony Cyber-shot DSC-M1

From an engineering perspective only, Epson's 500v is a Honda; Fuji's E550 is a truck; and Sony's new DSC-M1 is a Corvette. Heads will turn when you pull out this camera.

But you'll find the "wow" factor to be short-lived. The M1 is capable of doing double-duty as both a camera and a video recorder, but it doesn't excel in either role. Picture quality is good, but it's not up to Cyber-shot standards, and while the new MPEG-4 movie mode is decent, you'll still want to hang onto your bulky camcorder.

Designed to be used vertically, the M1 has a 2.5-inch LCD screen that swings out and rotates 270 degrees. The LCD isn't as sharp as the others in this roundup, but it's good and does "gain up" for easier viewing in low-light situations. Dual shutter-release buttons for movies and pics are located in the center of the body, within easy reach of your thumb, and they're replicated on the left portion of the LCD itself. Unfortunately, while the rest of the camera controls—menu, mode, zoom—are logically placed, they're too small to manipulate quickly and confidently in the field (this is particularly true of the zoom control). The M1 looks cool—and it's extremely well built—but it's awkward to use. (Even the top-mounted lanyard is a pain, because it drapes in front of the lens.)

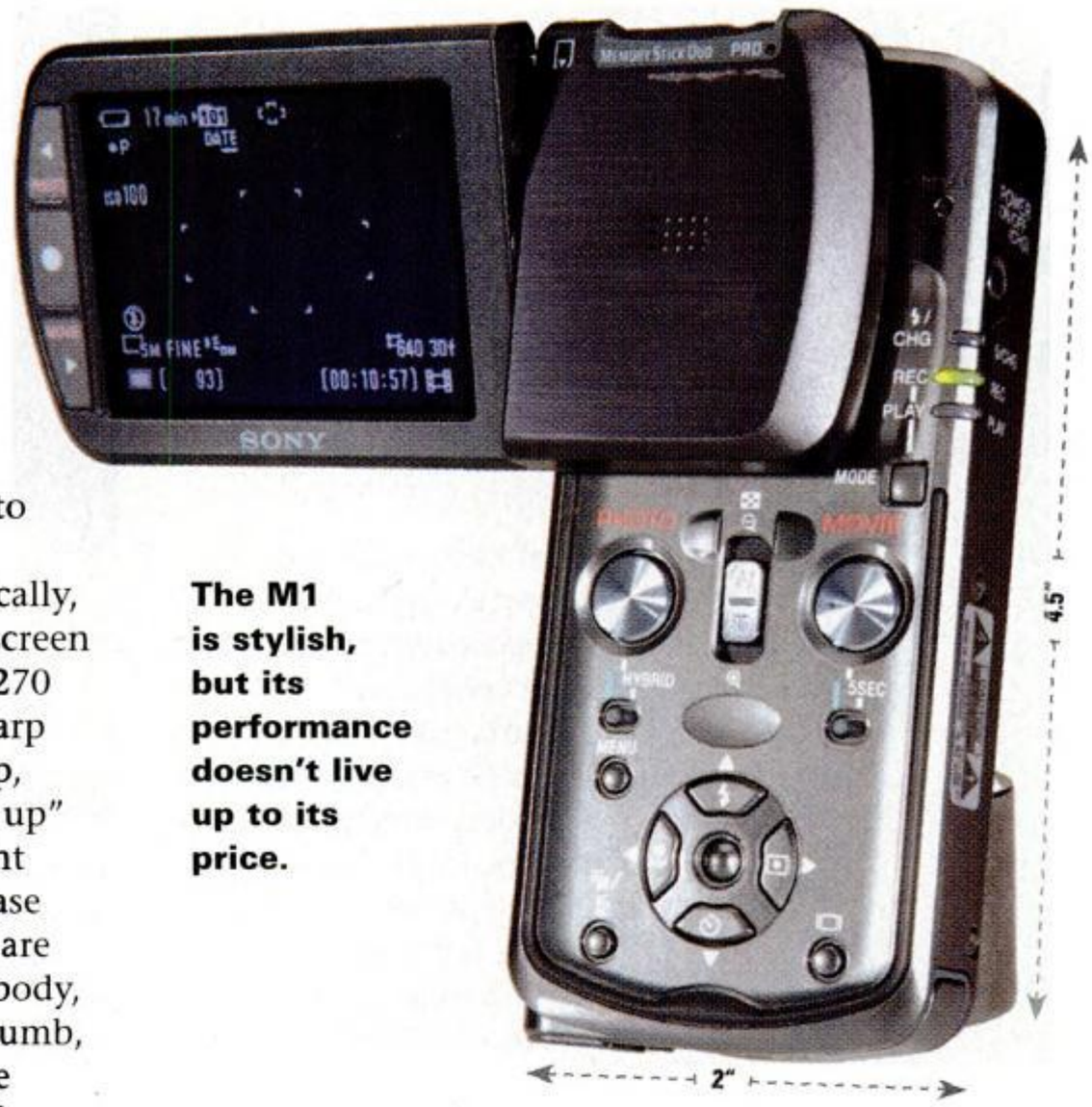
One of the M1's claims to fame is a fairly innovative hybrid mode that records 320x200, 15fps video five seconds before a picture is taken, and then three seconds after. The theory behind this feature is to capture a picture's context; unfortunately, awkward playback pauses before and after the still reduce the feature to a gimmick.

The M1 performs respectably, with a cycle time between shots of about one second, and it suffers little shutter lag. The M1's battery life, on the other hand, was the worst of the group—we captured less than 200 shots on a charge (heavy video use drains the battery quickly). Although there are seven auto-program mode settings that cover just about every shooting condition, manual control options for exposure, shutter, and white balance are AWOL.

The M1's 5.1 megapixel image-sensor is paired with a Carl Zeiss Vario-Tessar lens with 3x optical zoom, and the pair produces pics with good color balance and exposure. Images nonetheless tended to be soft, with background objects often appearing "fuzzy." Video captures look—and sound—quite good (the stereo microphone really helps). It doesn't approach the quality of a conventional DV camcorder, but the M1 would be handy in a pinch—especially when you consider that a 1GB Memory Stick Duo or Pro card can hold up to 45 minutes of 640x480/30fps video.

The M1 includes a cradle that must be used to connect to a PC (USB 2.0) or TV, or to recharge the battery. There's no direct-connection option to view your pics and movies on a TV—you must use the cradle, which is very inconvenient.

Like a futuristic concept car at an auto show, the M1 looks impressive, but it's just not practical for road use.



The M1 is stylish, but its performance doesn't live up to its price.

CYBER-SHOT DSC-M1

MAXIMUM PC VERDICT 6

+ ZERO TRANS FAT

Good video quality and sound; interesting design.

– OLESTRA

Awkward to use; picture quality not up to snuff; missing manual controls; expensive.

$600, www.sony.com

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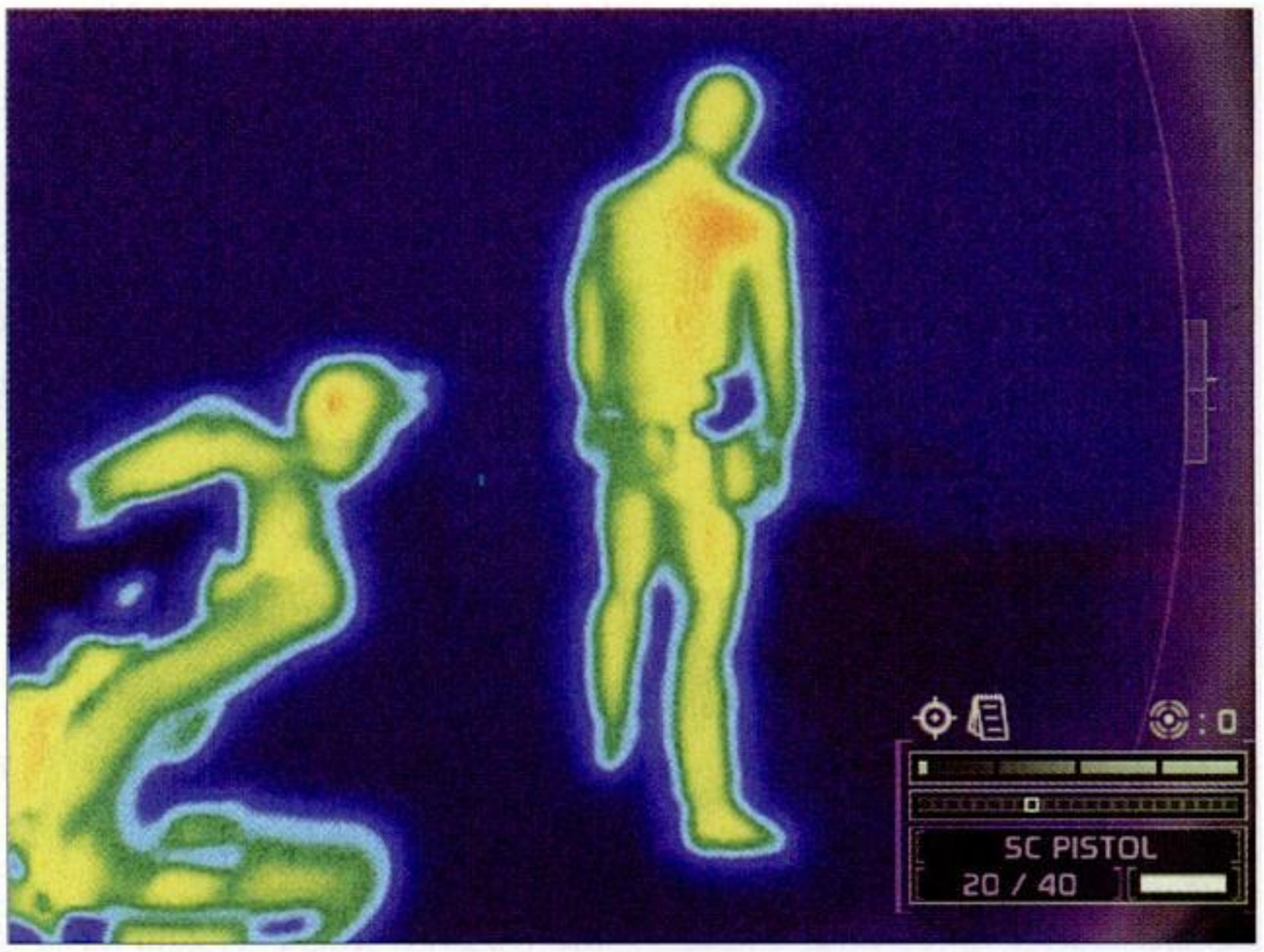
Splinter Cell: Chaos Theory

MAXIMUM PC KICK ASS PRODUCT

Quietly making noise



This guard's about to have a very bad day. Whether you shoot him in the back of the head, grab him from behind, or let him live is up to you.

The original *Splinter Cell* reinvented the stealth shooter. Its sequel *Pandora Tomorrow* delivered near-perfect objective-based multiplayer. The latest installment to the series, *Chaos Theory,* takes the best from its two predecessors to deliver a game that's superior to both. With an inspired single-player campaign, more of the same spy-vs.-mercenary multiplayer, and a brilliant co-op mode, *Chaos Theory* delivers.

As always, you assume the role of Sam Fisher through 10 single-player missions. Settings range from NYC during a blackout to Hokkaido, Japan. We're pleased to report that the single-player portions of *Chaos Theory* are much more forgiving than in previous iterations. In addition to allowing the player to save the game anywhere, *Chaos Theory* objectives are separated into three broad categories: primary, secondary, and opportunity. Fail a primary objective, and you fail the mission; the remaining objectives are optional. In fact, we accidentally gave a friendly target a dirt nap and *still* went on to complete the mission. Not having to repeat large sections of a mission because of one tiny fatal blunder eliminates 90 percent of the previous games' tedium.

Our favorite gadget is the sticky camera. In addition to peeking around corners, it makes sounds that lure unsuspecting guards into gassing range.

As always, you have an impressive array of super-spy gizmos at your disposal. In addition to such favorites as the sticky camera and the smoke grenades, you also have a K-Bar knife and a pistol-mounted EMP weapon that's capable of taking out most electronics—including lights, TV sets, and computers. The EMP pistol is the perfect diversionary tool: Enemy guards almost always leave their patrol route to investigate malfunctioning equipment, giving you an opportunity to either sneak by unseen or neutralize the target while he's distracted. The knife also gives you a convenient way to quickly dispatch any enemies that might see you and set off an alarm.

Hacking computers finally requires some skill. Using your PDA, you have to select the correct key sequence to hack doors and computers.

When you finish each mission, the game rates your performance based on the number of times you were detected, the number of people you had to kill, and the objectives you accomplished. To achieve a perfect 100 percent on a mission, the enemy should never know you were there. You need not achieve a high rating to continue, but the new scoring system adds much-needed replayability to the single-player campaign.

The brand-spanking new two-player co-op mode is exactly what co-op should be. Instead of simply chucking two people into a single-player mission, Ubisoft Montreal built four exquisite new missions specifically designed for co-op play. These missions are not to be missed. Co-op mode demands teamwork—you'll need to assault several enemies at the same time, and cooperation is necessary to complete the missions. Voice communications are crucial, but keep 'em quiet. If you talk too loud, the enemies will hear you. Our only complaint with co-op? Four missions ain't enough.

Chaos Theory's final boffo feature is its spy-vs.-merc, two-on-two multiplayer. One team consists of two mercs, the other of two spies. As in *Pandora Tomorrow*, each team has different weapons and vision modes—the spies gravitate toward nonlethal weapons, while the rent-a-cops tote weapons with maximum kill power. This small-scale, objective-based multiplayer action is a welcome diversion from the massive battles we've come to expect on the PC. We're stoked that the latest version of *Splinter Cell*'s multiplayer features built-in voice comm, but the quality is lacking, even over a rock-solid connection.

Chaos Theory is the best installment of *Splinter Cell* yet. No serious gamer should miss it.

—WILL SMITH

MAXIMUM PC VERDICT 9

+ SPOOK

Excellent single-player campaign, and co-op kicks serious ass.

– PINKERTON

Not enough co-op missions, and voice-comm quality is so-so.

$50, www.splintercell.com, ESRB rating: M

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Knights of the Old Republic 2: The Sith Lords

This sequel makes for a strong case of deja vu

It's not a scene from *Sky Captain*, but the world of tomorrow is inhabited by giant killer robots. That's right, giant killer robots.

Single-player role-playing is far from dead. *Knights of the Old Republic* rekindled our love for captivating RPGs and delivered a perfect *Star Wars* experience. This sequel reprises the same formula—complex storytelling leavened with difficult moral choices—to great effect. Irritating bugs and a rushed ending dull its sheen, but the Force is still strong in *KOTOR 2*.

Set five years after the conclusion of the first game, you re-enter a galaxy far, far away in the same manner as the previous adventure: as an amnesiac with a mysterious past. An exiled Jedi who fought in the Mandalorian and Jedi Civil Wars, you're hunted by the Sith and an alliance of Bounty Hunters. As you journey, wayward travelers—each with a unique backstory—join you on your quest to rebuild the Republic and the Jedi Order.

New to *KOTOR 2* are Lightsaber stances—techniques that let you switch your fighting style to suit your opponent's.

KOTOR 2's writing is its strongest asset. The spellbinding plot is wonderfully layered, and almost all of your missions and actions build upon the underlying narrative. You travel to various planets in search of Jedi Masters, but at each location, they are unveiled differently. On Dantooine, you can join a Jedi defending a key building from mercenaries, but on another planet, the resident Jedi might come to *your* rescue after an unfortunate misstep.

As the title suggests, much of the sequel's story revolves around the history of the Sith and their function in balancing the Force. Once again, your actions determine whether you follow the light or dark side of the Force. But this time, your inner struggle is complicated by the ability to sway the faith of up to 10 allies, each of whom has his or her own motives and troubled personalities.

Kiera, for example, will constantly warn of the weakness of blind selflessness, and she'll impose her pessimistic ideals whenever present. You can either listen and build up your level of influence over her, or you can try to persuade her to change her outlook. Similarly, a Sith assassin who joins your party is very impressionable, but you're free to either manipulate her beliefs or try to bring her to the light. The dialog does an admirable job of fleshing out complex relationships between Jedi and Sith, and there are definitely times when the Sith convictions sound appealing.

KOTOR 2 also includes plenty of side quests to keep you busy. You'll often have to rescue hapless settlers or refugees who have been scammed, or whose relatives or friends have been kidnapped. While you don't have to complete these missions, finishing them does open shortcuts to advance the plot, and it grants valuable experience points to level-up your character. We were able to max out key skills early in the game, leaving us free to experiment with both light and dark force powers later on.

Numerous references to the first *KOTOR* will delight fans, as will the cameo appearances of characters from the first game. Your ship is again the Ebon Hawk, hinting at a connection between your character and the events of the first game. The Pazaak and Swoop Racing mini-games make a welcome return, and they're as addictive as ever.

What you *won't* enjoy are the unacceptable technical shortcomings, such as scripting bugs. NPCs often run the same scripting triggers repeatedly, and cut scenes occasionally lack models or movement. The almost archaic graphics are understandable coming from a console port, but the low-resolution pre-rendered cut scenes are pathetic. The game even crashed twice between loading sequences, so save often.

There's no doubt that *KOTOR 2* is a must-have for any respectable gamer or *Star War* fan—but you might want to wait until a patch comes out before embarking on the adventure.

—NORMAN CHAN

MAXIMUM PC VERDICT 8

+ SITH LORD

Deeply involving plot, smart storytelling, and layered complexity; Pazaak!

– SITH LACKEY

Rampant scripting bugs, slow start, unresolved plotlines, and dated visuals.

$50, www.lucasarts.com, ESRB rating: T

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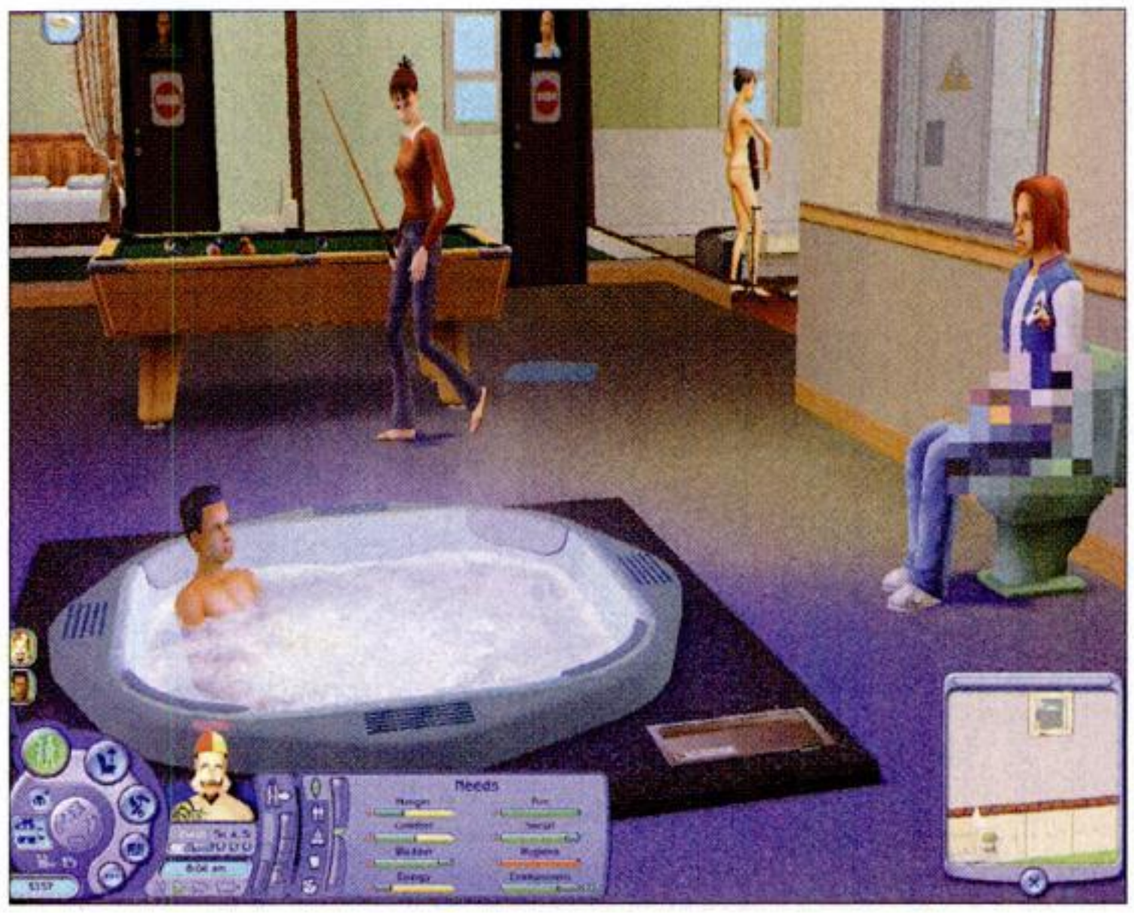
The Sims 2 University Expansion Pack

Here's your chance to act like Van Wilder



Ah... dorm life. One tip: Sell all of your dorm-mates' furniture and use the money to buy a Jacuzzi.

You can play the first *Sims 2* expansion pack—*The Sims 2 University*—any way you like: You can relive your own college experience, or you can create the experience you *wish* you had.

You can ditch class and lounge around your dorm blowing bubbles out of a bong until you get kicked out of school. Or you can study like a madman, make the Dean's list, and graduate with honors. How well you do in school ultimately affects your career options once you graduate—or drop out, if you're a bubble blower.

Because the *University* expansion pack integrates the college experience into the core gameplay of *The Sims 2,* you can now raise sims in *The Sims 2,* and send them off to college. Or you can just create a sim and *start* at college. Unlike real college, it's ridiculously easy to get good grades and make the Dean's list. Just do your assignments, write a term paper, keep a positive mood, and you'll skate by. (Maybe college is easier now than it was in the last century, when we were there.)

You never actually *see* a classroom in the game; instead, you jump from lot to lot (from your dorm to the student lounge, for example). The problem is the game never gives you a good reason to *ever* leave the dorms. You'll suffer through several loading screens if you do, and by the time you arrive at your destination, you have only a few minutes to play before you need to head back to the dorm to eat, sleep, or void your bowels.

One of the most interesting new features is that sims can now apply peer pressure to other sims. This is useful for getting people to do your homework assignments or prank your enemies. Frank the Tank aficionados can also streak the quad, if that's your fancy.

This expansion offers a ton of new gameplay elements and it's a lot of fun; even after playing for hours, we felt like we had only scratched the surface. And that's the problem: The game never offers you much incentive to wander off the path of least resistance and explore its vast world.

—JOSH NOREM

MAXIMUM PC VERDICT 7

+ COLLEGE

Lots of new animations, fun gameplay, and hilarious interactions.

– THE REAL WORLD

Going anywhere takes forever; piss-poor frame rates.

$35, www.eagames.com, ESRB rating: T

CH Products Throttle Quadrant

Once again, CH pushes the realism (and geek) envelope for flight sims

CH fans: Think you've already got every gaming peripheral you need? Think again!

It won't do a thing to soften the "GEEK!" label slapped on hardcore flight-sim junkies, but the Throttle Quadrant will make every stick-jockey's favorite hobby immensely more pleasurable.

So what if new flight sims are few and far between these days? Every *Flight Simulator, LOMAC,* and *Pacific Fighters* pilot will be stoked at the prospect of adding six control axes to his desktop, each of which comes with two detents and 12 buttons (for engine idle and/or brake settings).

The Quadrant integrates smoothly into the typical CH flight-control setup, which consists of the USB Fighterstick, Pro Pedals, and Pro Throttle (which the Quad can either work with or replace). Plug in all four devices and you'll have no fewer than 350 programmable button functions—enough to keep the hardest of the hardcore busy, happily mapping out a new profile for their sim of choice (or you can just download one from **www.ch-hanger.com**). In theory, the Quadrant should work with hardware from other vendors, but it hasn't been tested.

Exhibiting the same rugged-but-bulky, no-frills construction of other CH gear, the Quadrant is a cinch to set up. The additional six levers provide an incredible degree of precision for controlling thrust and fuel mixtures, rendering feats such as formation flying much easier and more gratifying. If you're flying a four-engine plane, such as a B-17 or a 707, each lever can be used to control a single engine; alternatively, you can use the levers for such things as incremental flap or gear controls for a single-engine plane. Finally, the front-mounted switches are excellent for engine start/stop, tail-hook release, canopy open/close, and so on.

The only thing we really don't like about the Quadrant is that physical detents are only included at the bottom range of lever motion, not at the top. These would have been useful for afterburner and war emergency power settings. Although you can add that functionality via CH's included *Program Manager* utility, it's really no substitute for a detent.

When it comes to sims, anything that makes the experience more realistic is usually worth the price and programming to acquire. The Quadrant is no exception.

—STEVE KLETT

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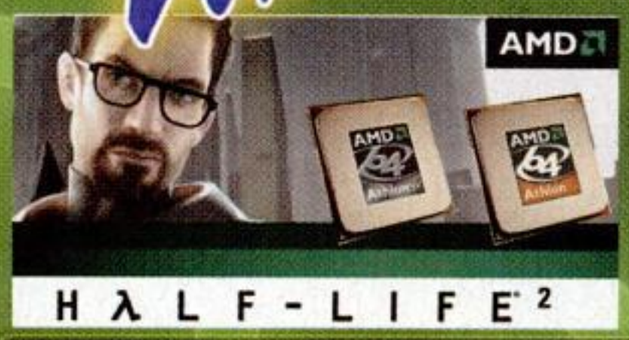

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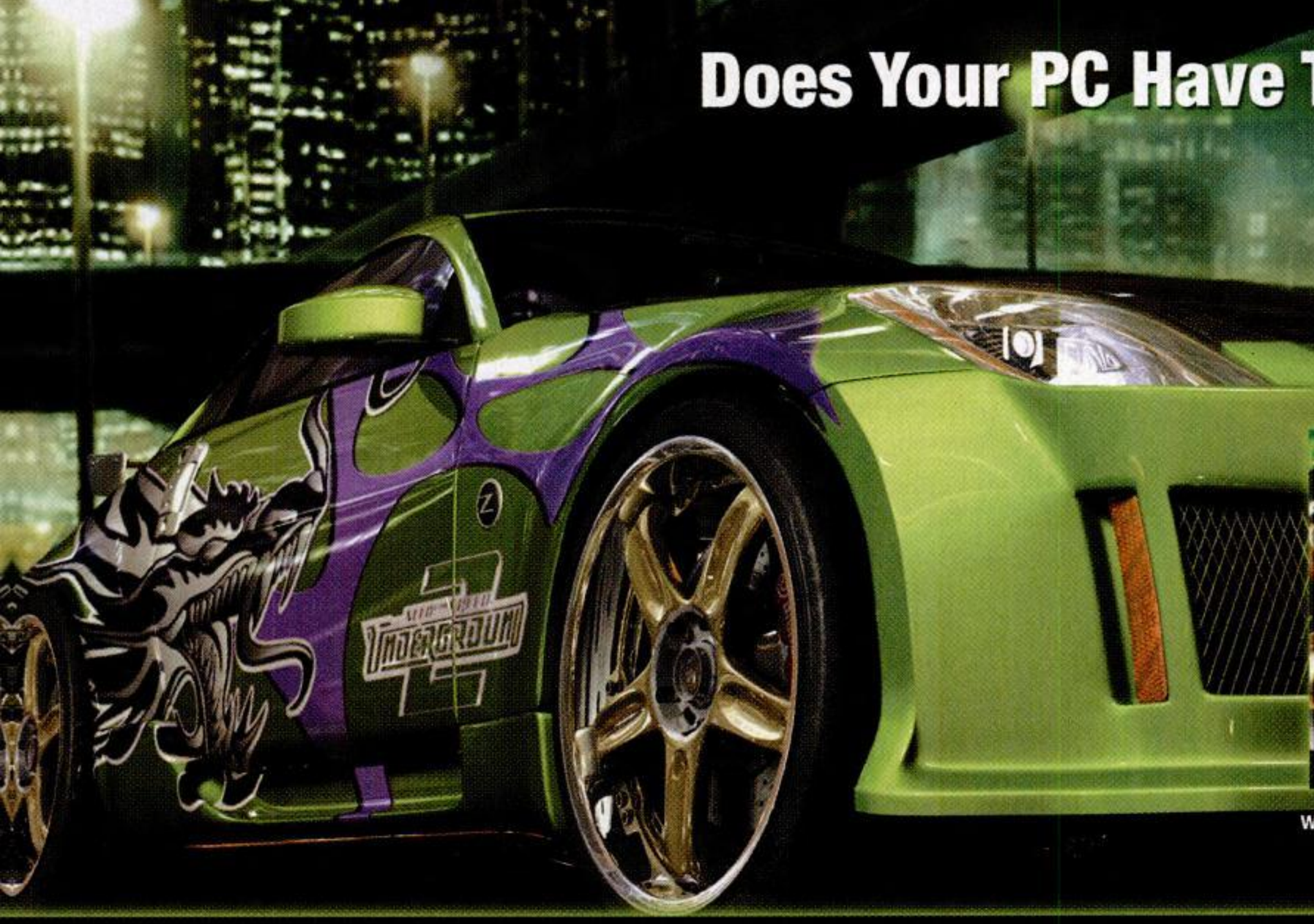

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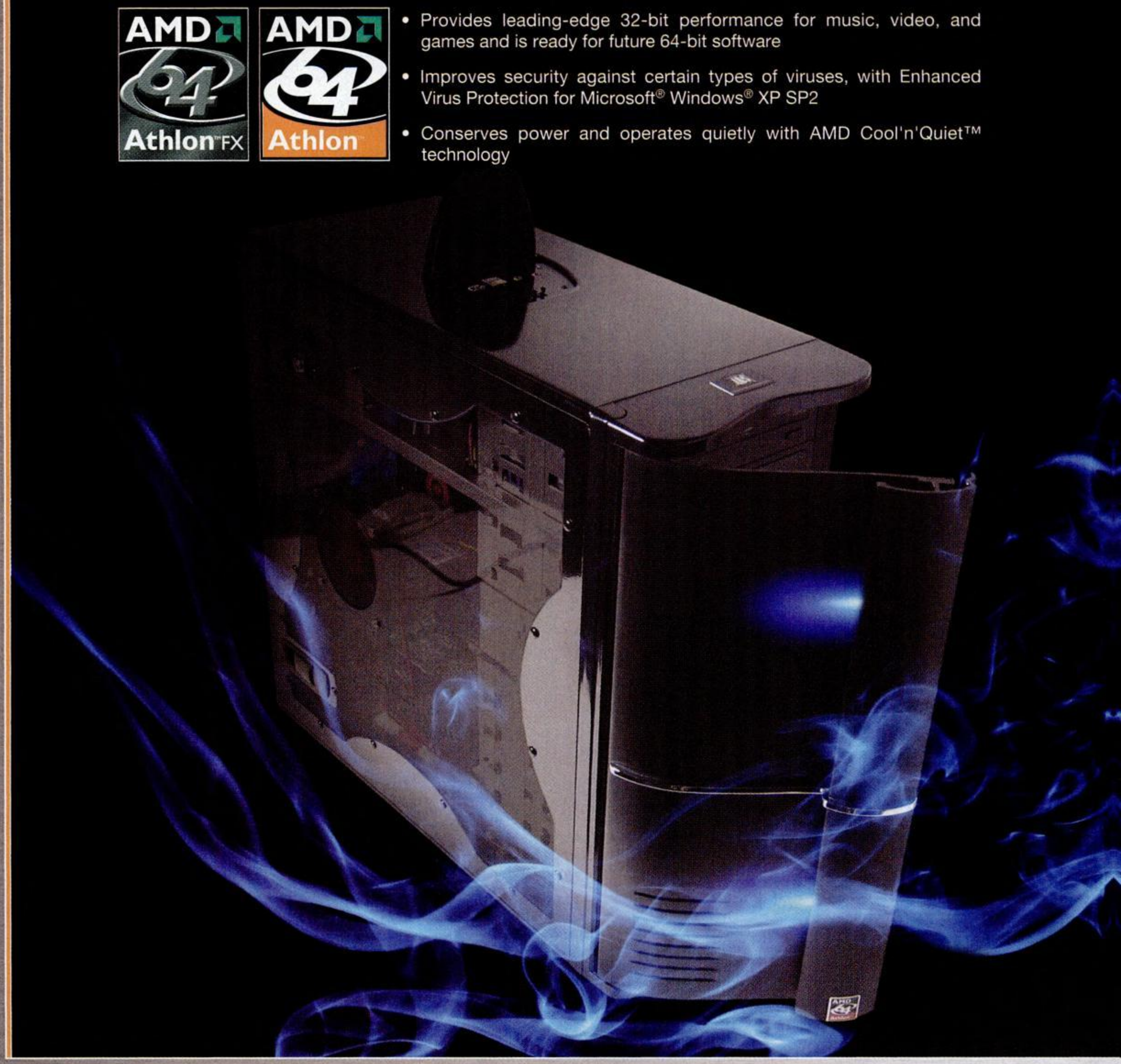

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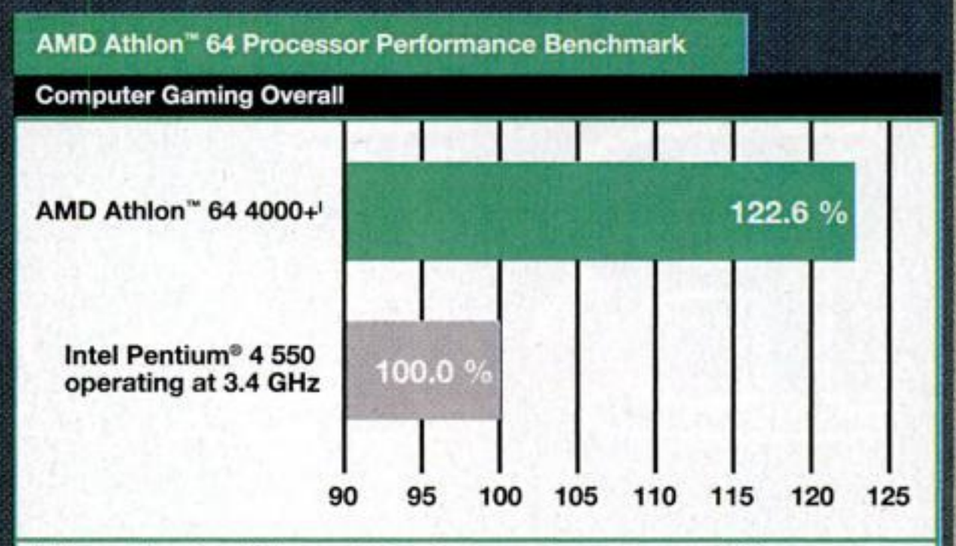

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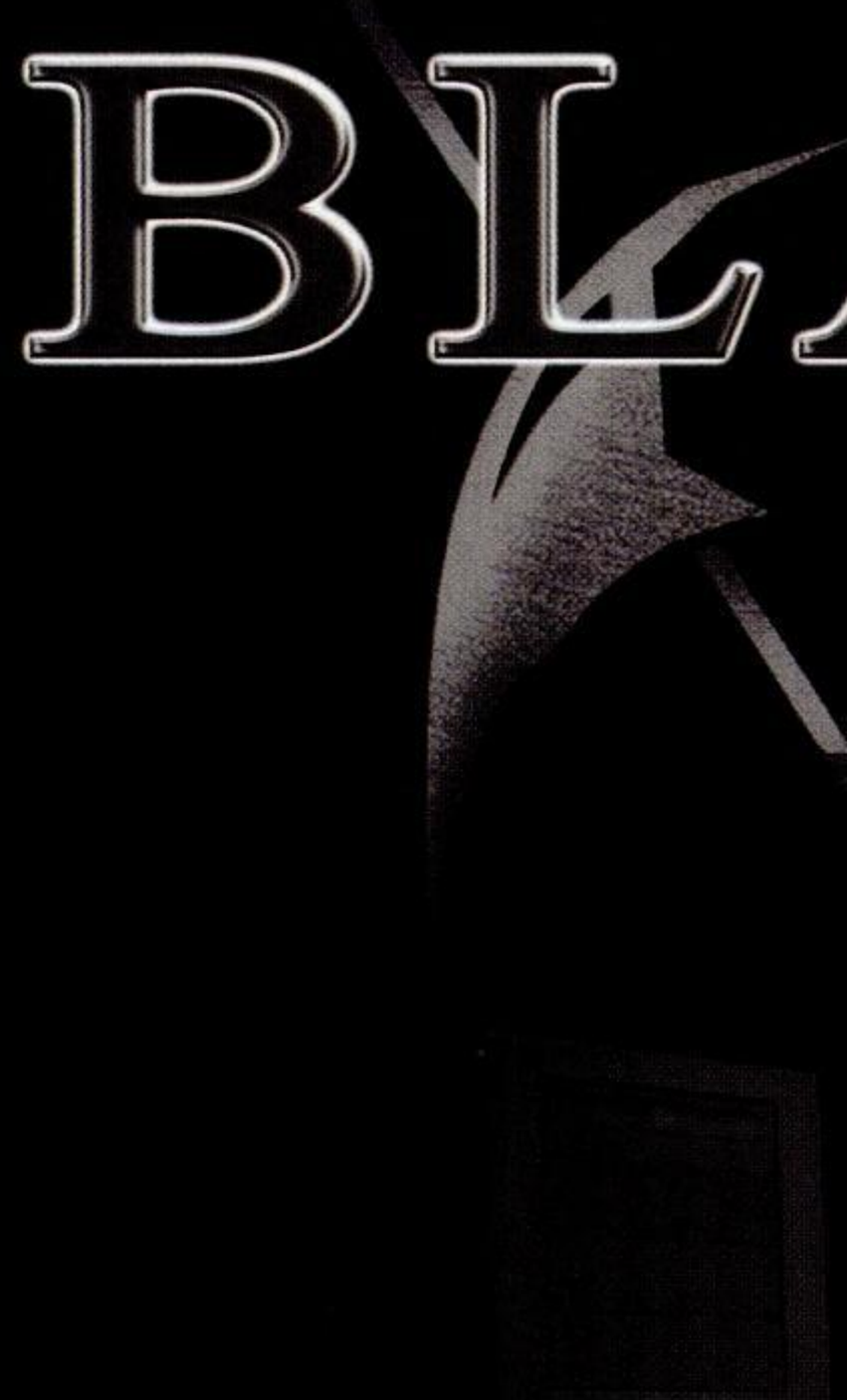

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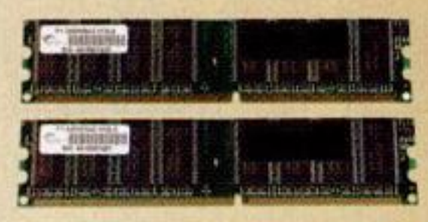

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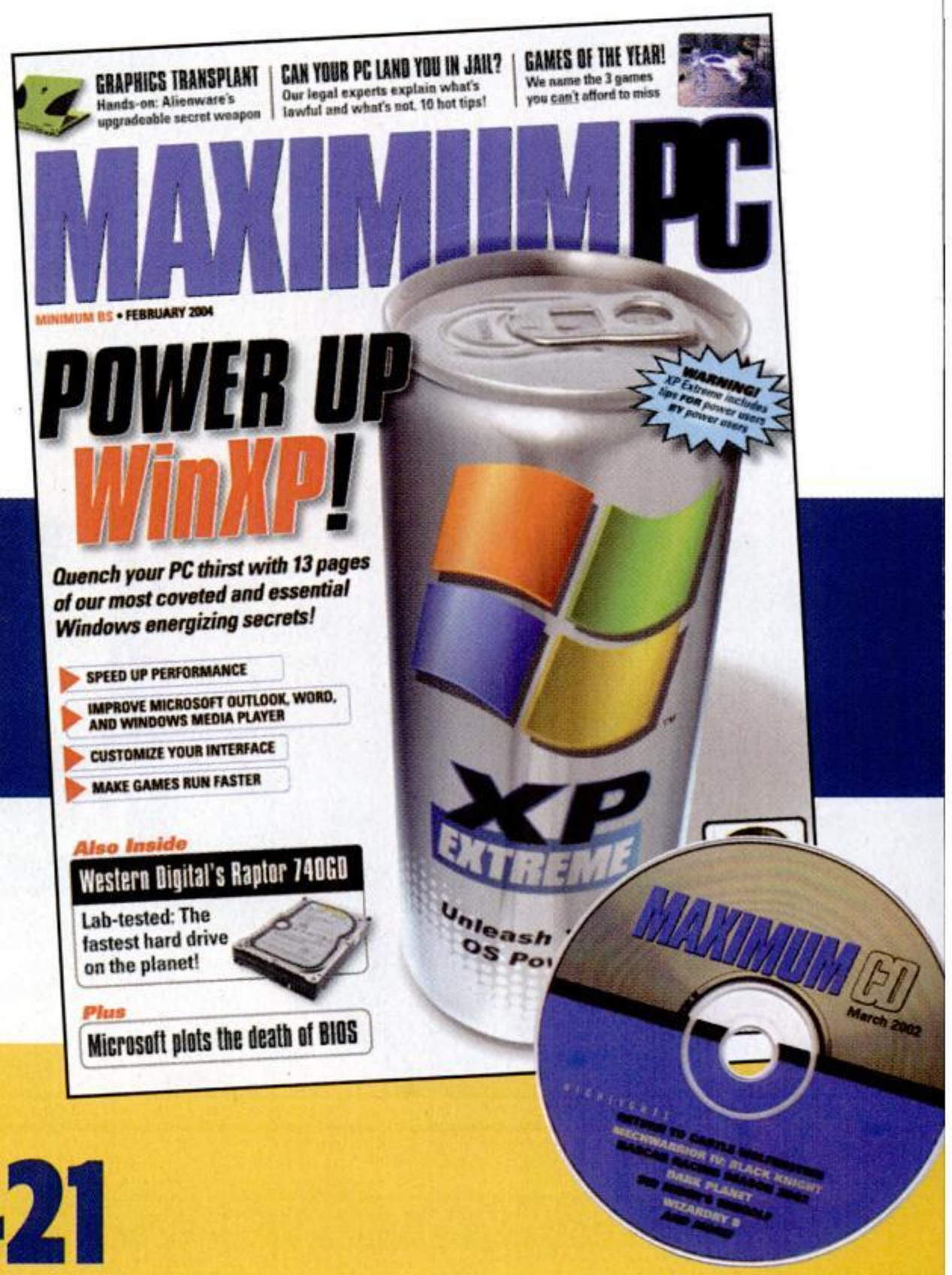
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Rig of the Month

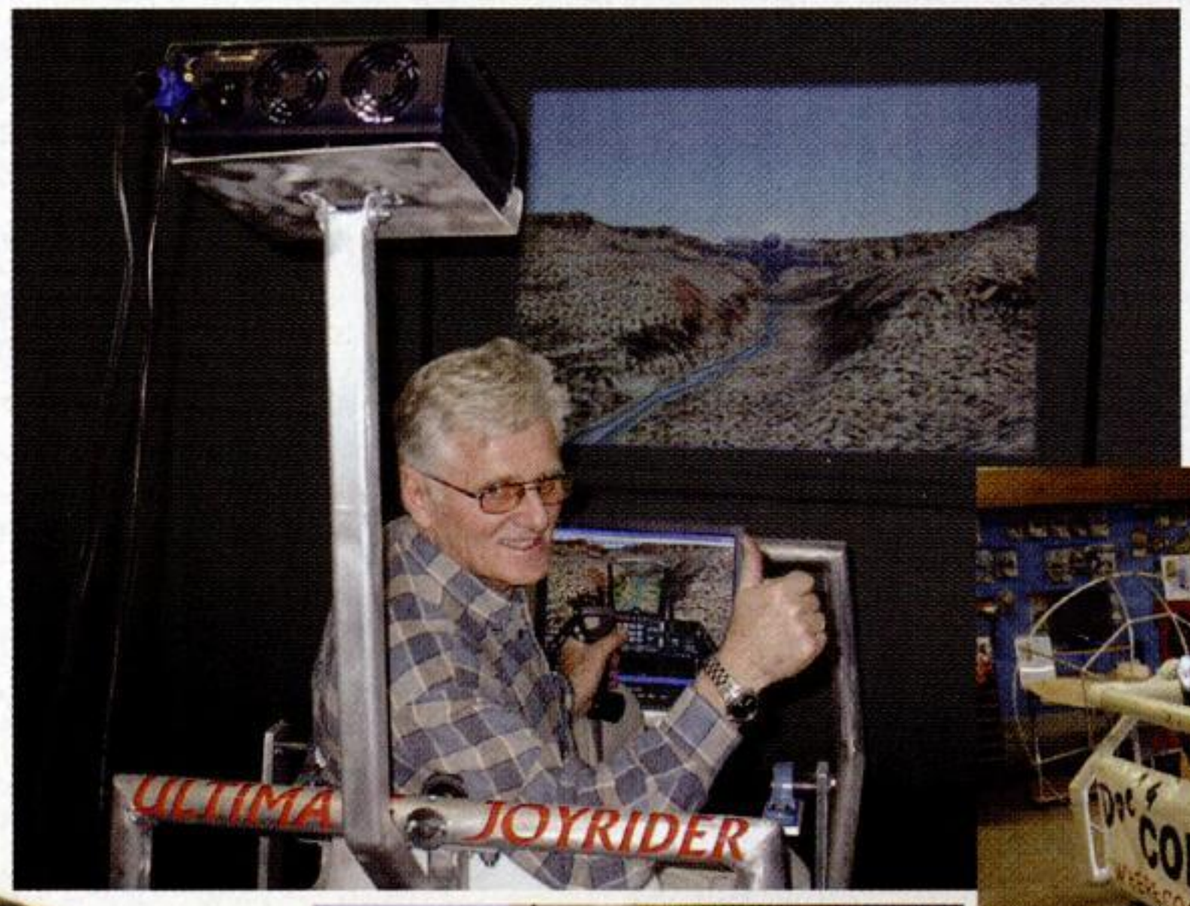
THIS MONTH: Doc Holloway's Ultimate Joyrider

Never underestimate a flight-sim fanatic. That's the message we get from Doc Holloway's Ultimate Joyrider.

The contraption's welded aluminum frame is decked out with pivots, potentiometers, and all the necessary controls—joystick, rudder pedals, and a throttle—for ultra-immersive acrobatic and combat flying. The seat adjusts to a user's center of gravity and moves in response to the control stick. An LCD is dedicated to dashboard duties so the scenery can be projected in all its glory on a large wall-screen.

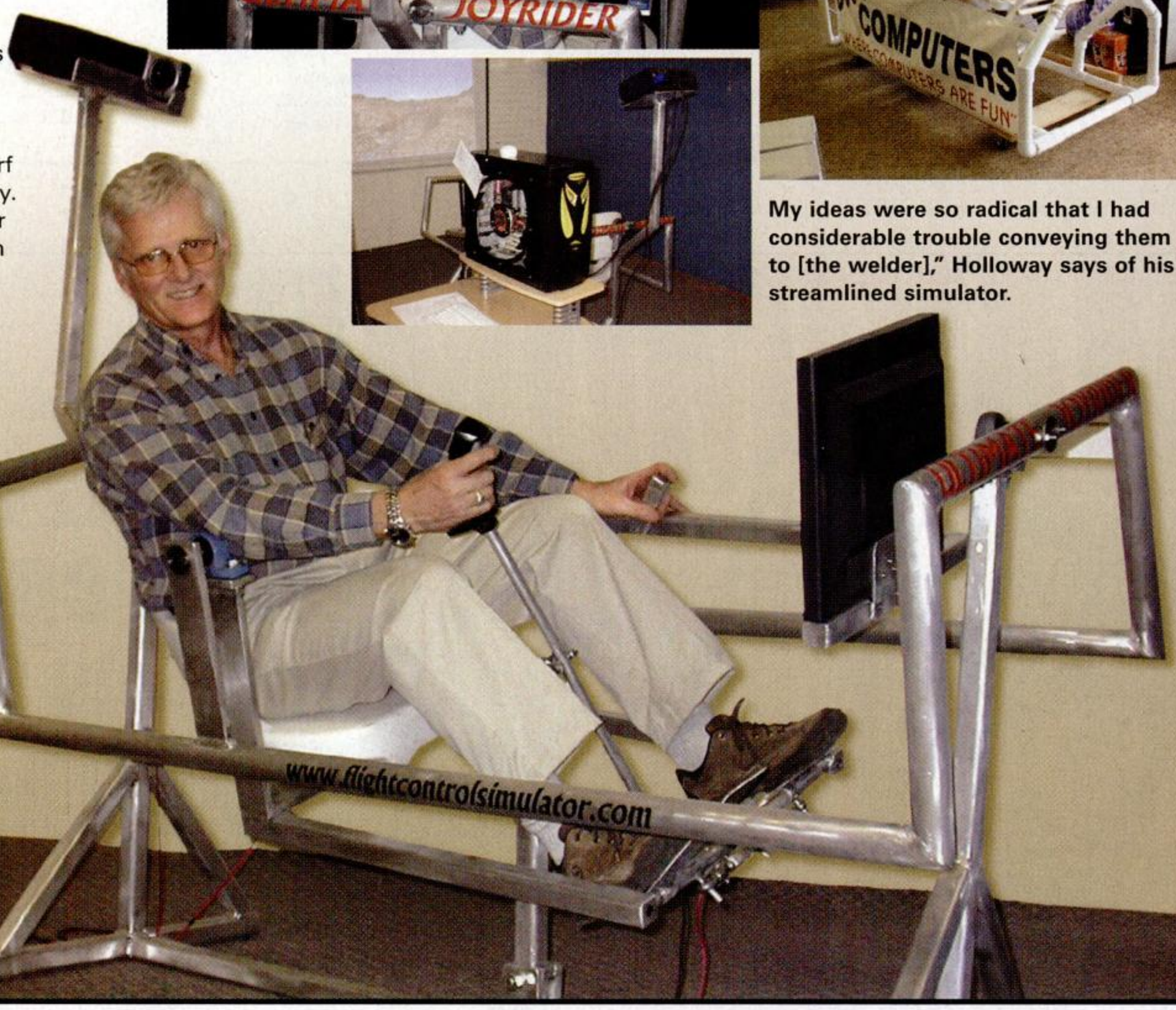
The sensation of movement can be overwhelming, apparently. "Experienced pilots who have flown my Joyrider and pushed it too hard have required a barf bag," says Holloway.

He, on the other hand, is more than comfortable with the aerodynamics. You'll often find him flying Mach 2 inverted, and executing snap rolls 50 feet over a lake.



Holloway's first effort was made from PVC-pipe. He says of the prototype, "Climbing in required gymnastic abilities... and [the rig] was too large to fit through a normal doorway without major disassembly. "

My ideas were so radical that I had considerable trouble conveying them to [the welder]," Holloway says of his streamlined simulator.



If you have a contender for Rig of the Month, e-mail **input@maximumpc.com** with high-res digital pics and a 300-word write-up.

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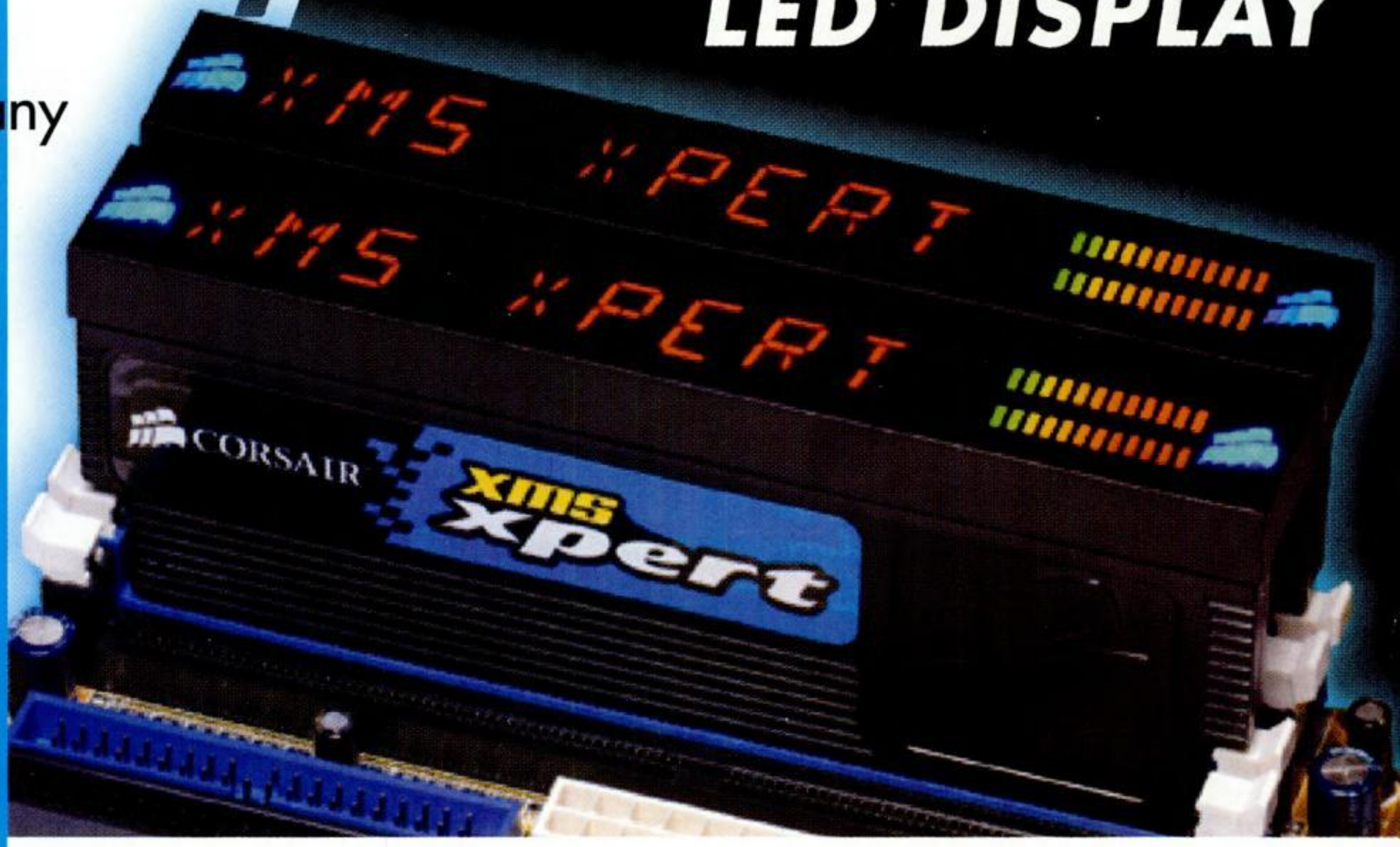

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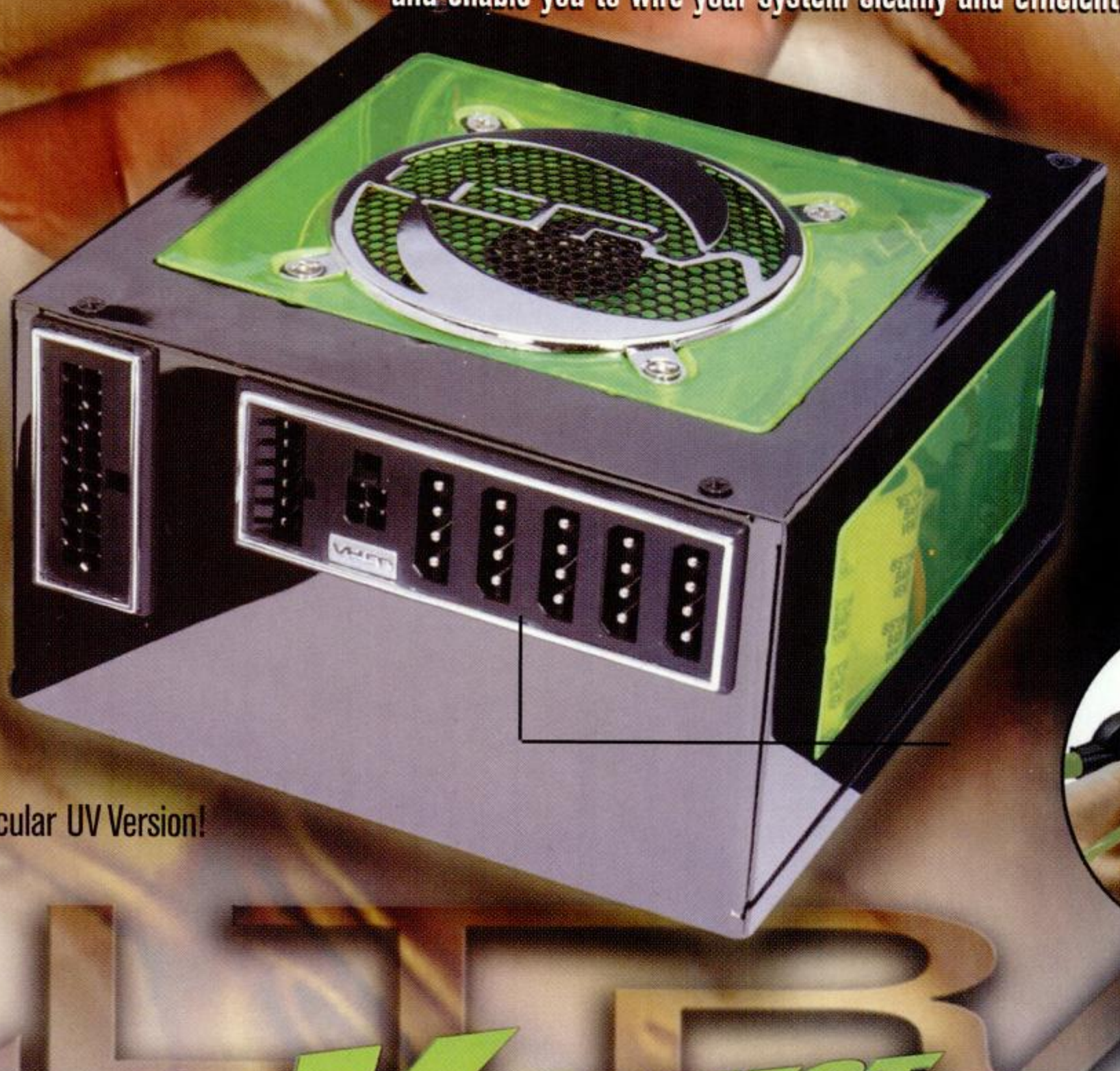

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